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Foreword

The UNITED STATES ARMED FORCES MEDICAL JOURNAL represents the unification of the BULLETIN OF THE UNITED STATES ARMY MEDICAL DEPARTMENT and the UNITED STATES NAVAL MEDICAL BULLETIN. This joint periodical is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense.

The Chairman of the Armed Forces Medical Policy Council and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this JOURNAL.

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OFFICE OF THE SECRETARY OF DEFENSE
ARMED FORCES MEDICAL POLICY COUNCIL
WASHINGTON 25, D.C.

MEMO: Personnel of the Medical Services of the United States Armed Forces

May I take this opportunity to express my sincere appreciation to each of you for your efforts these past two years as we developed the coordination of the medical and health services of the Department of Defense. You may be certain I shall follow in the months and years to come the work, the success and humanitarian efforts of each of you pulling together as a "medical team" for your country, the Department of Defense, your Services and your comrades in arms.

To my successor, Dr. W. Randolph Lovelace, II, I commend each of you and to you I warmly commend him. Together you will continue your strides in maintaining an ever advancing military medical service, justifying the pride our nation and its citizenry have placed upon you.

Richard L. Meiling

Richard L. Meiling, M. D.
Chairman

UNITED STATES ARMED FORCES
MEDICAL JOURNAL

Volume II June 1951 Number 6

Recent Experiences in the Treatment of War Wounds of the Chest[1]

Hu A. Blake, *Major, MC, U. S. A.*
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THE Korean war has resulted in 287 casualties with thoracic injuries being evacuated by air from 10 to 90 days (average 30) after being wounded, and admitted to this hospital prior to 22 January 1951. Features of their management emphasizing combined medical and surgical aspects will be discussed. The management of thoracic wounds has changed little since the major advancements in World War II and the almost universally good condition of these patients on arrival reflects excellent early care. The opportunity for detailed study of similar casualties so soon after injury in Zone of Interior hospitals was not generally afforded in World War II and the success encountered in the management of the patients here reported resulted from considering the patient as a whole. The combined efforts of the thoracic surgeon, internist, physiatrist, and the endoscopist emphasizing pulmonary function made thorough evaluation of each patient possible. There has been only 1 death in this group and that was caused by agranulocytosis 3 days after admission and was unrelated to surgical management. All but 4 (1.4 percent), exclusive of the patient who died, suffering principally from thoracic trauma have returned or are expected to return to full military duty.

(1) From the Fitzsimons Army Hospital, Denver, Colo.

MEDICAL ASPECTS

Included in the plan for studying such patients in general hospitals has been electrocardiography, microscopic examination of the purged stool, and meticulous chest fluoroscopy. Fluoroscopy has furnished significant information as to the bellows action of the lungs, diaphragmatic activity, localization of pleural fluid and metallic foreign bodies, as well as cardiac size, shape, and amplitude of pulsations. In 23 patients (8.4 percent) evidence of pericarditis or myocardial injury was present. The cause was clear in 2 patients who had retained shell fragments in the wall of the right ventricle or the interventricular septum. In 5, direct trauma to the heart and pericardium is inferred. In 16 whose trauma was unilateral the cause was obscure. Electrocardiographic evidence consisting of RS-T segment and T-wave changes was present in all 16 patients; pericardial friction rub and fluoroscopic findings of pericardial effusion was also present in half of this group. One patient had a significant congenital interauricular septal defect as well as traumatic pericarditis. This subject is discussed in detail elsewhere *(2)*. Had comprehensive study in the forward areas been practical, doubtless more instances of involvement of the heart and pericardium in thoracic injuries, not directly involving these structures, would have been demonstrated. No special treatment other than restriction of activity was required in any case after reaching this hospital, but pericardicentesis earlier might have hastened recovery and recognition of pericarditis would have averted the use of digitalis which was not beneficial.

Post-thoracotomy pericarditis was noted in 11.7 percent of 68 patients on whom thoracotomy was performed. This was a benign self-limiting inflammatory reaction of the pericardium, requiring no special treatment and apparently unrelated to the extent of the operation. It occurred only in patients having thoracotomies on the left side. All had normal preoperative fluoroscopic cardiac findings but abnormal postoperative changes consisting of globular cardiac silhouettes and diminished cardiac pulsations. An interesting finding in 1 patient was a normal ECG 8 days after operation with typical evidence of pericarditis developing 2 days later.

Lung abscess was noted in 6 patients and in several instances a pyogenic membrane was seen surrounding metallic foreign bodies removed at operation. Four patients presented what is believed to be traumatic pulmonary cavitation with retraction of the lung around the site of disruption of parenchymal continuity. An initial roentgenographic density around the cavity, lacking pathologic proof, may be caused by hemorrhage and atelectasis rather than inflammatory infiltration. Such a concept is supported by transient spitting of blood after injury, absence of significant amounts of purulent sputum, or constitutional evidences of infection, and a benign course to complete healing without treatment except antibiotics given for prophylaxis (fig. 1).

(2) Wise, S. P., III: Pericarditis in thoracic trauma. (To be published.)

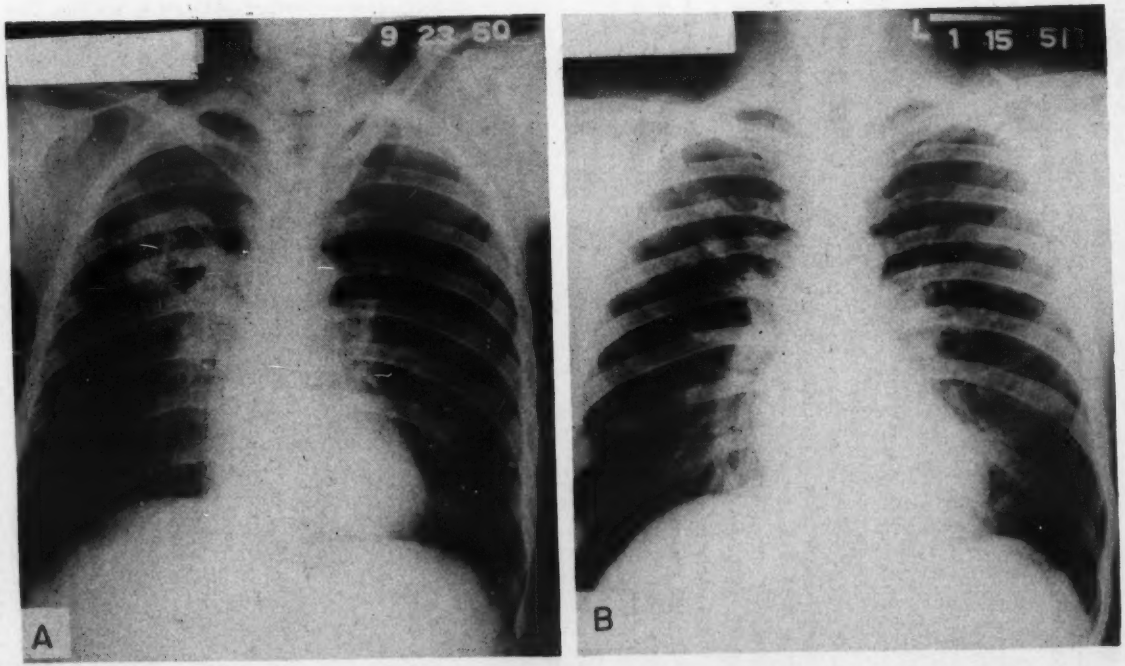

Figure 1.—(A) *Roentgenogram of the chest suggesting cavitation of the right lung in a patient having suffered a penetrating injury of the right side of the chest.* (B) *Same patient. Clearing of area in the right lung.*

Fifteen patients developed "viral" hepatitis. Two appeared to be of the infectious hepatitis type and in 13 the onset was from 90 to 120 days following plasma infusion. Undoubtedly more will develop as the clinical course of these casualties is followed. The course of this disorder is benign when the patient is treated with bed rest and a high-carbohydrate, high-protein, and low-fat diet. In patients with large wounds of the chest wall healing seemed to be slower in the presence of infectious hepatitis, but normal in patients who developed homologous serum jaundice. Of 8 patients with thoracico-abdominal wounds associated with known liver trauma, 3 had atypical lymphocytes suggestive of infectious mononucleosis. Heterophile antibodies were absent.

Twenty-six patients (9 percent) were found to have various pathogenic intestinal parasites including *Endamoeba histolytica,* hookworm, *Trichuris trichiura, Ascaris lumbricoides, Strongyloides stercoralis,* and *Giardia lamblia.* These findings are a reflection of the poor sanitary conditions in Korea.

Mild anxiety symptoms usually resolved with minor supportive measures but in 10 patients psychiatric symptoms were prominent. In 4 pain thresholds were so low as to interfere with adequate cooperation with the physiatrist.

SURGICAL MANAGEMENT

In the Zone of the Interior, the problem facing the thoracic surgeon dealing with thoracic trauma in war casualties from overseas is not one of saving life but rather that of restoring pulmonary function. Equipped with the antibiotics, blood transfusions, endotracheal anesthesia, and such recently developed enzymes as streptokinase and streptodornase, traumatic thoracic surgery may well be on the threshold of even greater accomplishments. The emphasis may now be extended from the experience of World War II towards further restoration of pulmonary function and the minimizing of chest deformity. The proved safety of operation and rapid rehabilitation following thoracic surgical procedures has greatly altered the treatment of thoracic injuries. The removal of intrapulmonary metallic foreign bodies or pulmonary decortication in the treatment of the unexpanded lung even in the presence of empyema and persistent bronchopleural fistula has proved valuable. Retained intrapulmonary metallic foreign bodies were the presenting problem in 35 (12 percent) of the 287 patients in this series. Operation was recommended and accepted by 34 patients. About 75 percent of the missiles were shell fragments, jagged and irregular, and usually accompanied in their passage through or into the chest by clothing and debris. Patients are generally advised to have intrapulmonary metallic foreign bodies of 1 cm. or more in diameter removed. The position of the foreign body, its size and shape, relationship to large vessels, and evidence of parenchymal reaction or abscess formation

about the missile determine the need for removal *(3) (4)*. An interesting phenomenon has been observed in uncomplicated cases of metallic foreign bodies within the lung substance in that pulmonary function studies have repeatedly shown a decrease in function on the side containing the missile which has reverted to normal following its removal.

In the treatment of traumatic hemothorax whether clotted, organized, or infected, pulmonary decortication by surgical methods has been employed in 25 patients. This procedure, which was so successfully applied during World War II is being further extended in the treatment of patients with empyema and persistent bronchopleural fistula. Following parenchymal bleeding, clot formation occurs at varying intervals of time with subsequent fibroblastic and capillary invasion forming the so-called "peel" of an organizing hemothorax (fig. 2). This peel does not represent thickened visceral pleura but rather a newly formed layer of fibrous tissue capable of preventing re-expansion of the collapsed lung and causing immobility of the chest wall. Its surgical removal releases the encased lung permitting an increase in its function. The use of antibiotics plus streptokinase and streptodornase preoperatively have decreased the dangers of infection associated with surgical intervention *(5) (6) (7)*. Persistent bronchopleural fistulas have repeatedly closed following decortication with complete lung re-expansion.

As a part of the comprehensive evaluation of traumatic hemothorax and intrapulmonary metallic foreign bodies, pulmonary function studies were accomplished including bronchoscopy for the elimination of the presence of any endobronchial pathology, external spirography, and bronchospirometry. External spirography was of value in these cases only in measuring total respiratory function, emphasis being placed on the values for maximum breathing capacity, respiratory reserve, and recovery following standard exercise. In these casualties, however, we were dealing largely with unilateral thoracic trauma and divided simultaneous lung function as determined by bronchospirometry was most important. The values for oxygen consumption and vital capacity of each lung separately were most frequently affected in these casualties. Bronchospirometry was helpful in the selection of patients for operation. It served also as a better method for evaluating results ob-

(3) Burbank, B.; Burford, T. H.; Samson, P. C.; and Mesirow, S.: Experience in localization of thoracic foreign bodies. J. Thoracic Surg. 15: 64-75, Feb. 1946.

(4) Fitzpatrick, L. J.; Adams, A. J.; and Burbank, B.: Nerve block in treatment of thoracic injuries. M. Bull. North African Theat. Op. (no. 3) 2: 51-52, Sept. 1944.

(5) Sherry, S.; Tillett, W. S.; and Christensen, L. R.: Presence and significance of desoxyribose nucleoprotein in purulent pleural exudates of patients. Proc. Soc. Exper. Biol. & Med. 68: 179-184, May 1948.

(6) Read, C. T., and Berry, F. B.: Utilization of streptokinase-streptodornase in patient with hemopneumothorax and patient with postpneumonectomy sanguineous coagulum. J. Thoracic Surg. 20: 384-392, Sept. 1950.

(7) Sherry, S.; Tillett, W. S.; and Read, C. T.: Use of streptokinase-streptodornase in treatment of hemothorax. J. Thoracic Surg. 20: 393-417, Sept. 1950.

Figure 2.—(A) Intact infected hemothorax sac removed by pulmonary decortication. (B) Same sac after section. Note foreign body in the upper right-hand corner.

tained by operation (8) In World War II these data were generally not obtainable and many persons were retired from the military services who doubtless had normal or ample pulmonary function for the performance of most if not all military duties. These circumstances can now be largely prevented with the resultant saving of considerable sums to the government.

REHABILITATION

The physiatrist deals with the prevention of chest deformity and restoration of function. In a number of patients with borderline indications for decortication, improvement in pulmonary function following selective pressure-expansion exercises was such as to obviate operation. Selective breathing exercises were started early and vital capacity was recorded weekly. This form of predominantly unilateral breathing became virtually automatic with the patient in the preoperative phase so that postoperative maintenance of a mobile chest wall and diaphragm were greatly facilitated. In the immediate postoperative phase pressure-expansion exercises were begun on the ward. Proper bed positioning and assistance in shoulder motion exercises were cared for by the physical therapist. Breathing exercises for 5 minutes of each hour and shoulder exercises at 3-hour intervals were accomplished. Frequent coughing was encouraged. Seven to 10 days after operation and following removal of the sutures the patient was followed in the Physical Medicine Clinic with individual instruction and group participation, each once daily. Friction massage was applied to free the tissues in the region of the surgical scar. When satisfactory status was obtained, the patient was sent to the physical reconditioning gymnasium for continued group therapy and by from 21 to 30 days after operation, he was fully rehabilitated and ready for convalescent furlough. He was carefully instructed as to the importance of continuing pressure expansion exercises while at home.

CASE REPORTS

Case 1.—A 22-year-old soldier was injured in the right thorax on 1 September 1950 and admitted to this hospital on 18 September. On 1 September a right thoracotomy had been performed in Korea with repair of lacerations of the right lung, right diaphragm, and liver. On arrival at this hospital the patient was febrile, moderately toxic, complained of marked shortness of breath, and roentgenograms revealed multiple pockets of air and fluid within the right pleural space. Thoracentesis revealed purulent fluid from which hemolytic *Staphylococcus aureus* was cultured. Streptokinase, streptodornase, and penicillin were used intrapleurally with removal of increased amounts of thin purulent material. The lung did not re-expand and decortication of the right lung was performed on 3 November. Densely adherent to the posterior and

(8) Forsee, J. H., and Kylar, S. L.: Pulmonary function in traumatic hemothorax treated by decortication. (To be published.)

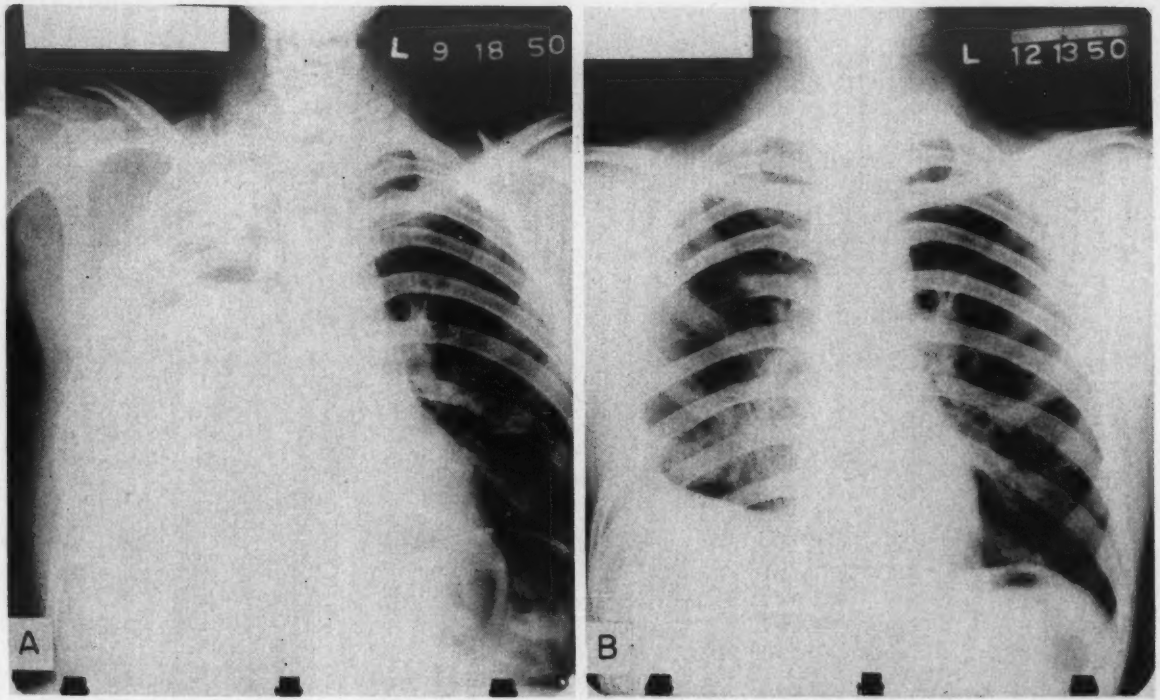

Figure 3.—(A) *Roentgenogram of chest revealing multiloculated empyema on the right. There is no visible aerated right lung.* (B) *Roentgenogram of chest of same patient, 40 days following operation. The lung is completely re-expanded.*

lateral portions of the chest wall and encasing the lung and the superior surface of the diaphragm was a tough fibrous peel averaging 0.4 cm. in thickness. A 150 cc. empyema pocket was situated between the two layers of the peel; the diaphragm was immobile and elevated; and the costophrenic angle was obliterated. The encased lung was half its normal size. Decortication was easy and the peel was completely

TABLE 1.—*Preoperative and postoperative pulmonary function*

	19 October (percent)	*1 December* (percent)
Right lung:		
Oxygen consumption	37.5	53
Vital capacity	36.4	53
Left lung:		
Oxygen consumption	62.5	47
Vital capacity	63.6	47

removed. Immediate re-expansion of the lung and resumption of diaphragmatic excursion occurred. The postoperative course was uneventful (fig. 3). Comparison of the preoperative pulmonary function studies and those made 4 weeks following operation showed improvement of function with restoration to normal values (table 1).

Case 2.—A 24-year-old soldier was wounded in the left thorax by multiple shell fragments on 12 September 1950. He was admitted to this hospital on 2 October complaining only of exertional dyspnea. A roentgenogram of the chest showed haziness over the left lower hemithorax and two metallic missiles were believed to be within the left lung. The left diaphragm was immobile. No fluid was obtained by thoracentesis. Pulmonary decortication with removal of an intrapulmonary metallic foreign body was performed on 3 November. At operation the

TABLE 2.—*Preoperative and postoperative pulmonary function*

	27 October (percent)	*7 December* (percent)
Right lung:		
Oxygen consumption	80	55
Vital capacity	83	68
Left lung:		
Oxygen consumption	20	45
Vital capacity	17	32

posterior and lateral lung surfaces were densely adherent to the chest wall and covered by a tough fibrous peel 0.8 cm. thick. Parietal and visceral components were not distinguishable because of fusion. This thick peel diminished anteriorly and superiorly. The left wing of the diaphragm was immobile, elevated, and the costophrenic angle was obliterated. Because of its adherence the peel was separated with

difficulty and could be only partially removed about the lower end of the descending aorta. The lung immediately re-expanded and diaphragmatic excursions were resumed. The postoperative course was uneventful. Comparison of the preoperative pulmonary function studies and those made 5 weeks later showed improvement with return to virtually normal function (table 2). The patient was returned to full military duty.

SUMMARY

In the management of 287 casualties from Korea suffering from thoracic injuries only one death occurred; it was caused by agranulocytosis and was unrelated to operation. The application of the principles so successfully employed in World War II have been further extended with excellent results. The advancements recorded appear to be the encouraging results encountered in the use of streptokinase and streptodornase in the treatment of traumatic hemothorax and the studies of pulmonary function as an aid in evaluating surgical results, especially of pulmonary decortication. The unreliability of roentgenographic evaluation of pulmonary function has been regularly encountered but bronchospirometric methods appear to be valuable adjuncts in assessing pulmonary function following thoracic injury. The working together of the thoracic surgeon, internist, endoscopist, and physiatrist as a team affords the best conditions for the management of patients suffering from thoracic injuries.

Early Management for War Wounds of the Genitourinary Organs[1]

Burdick G. Clarke, *Lieutenant Commander, MC, U. S. N. R.* (2)

Wyland F. Leadbetter, *M. D.* (3)

THE outbreak of fighting in Korea during the summer of 1950 prompted us to review all available published reports on the treatment for war wounds of the genitourinary tract during World War II and such other literature on developments since the war that would have a bearing on the treatment for such wounds. The cardinal importance of antibiotics, of body fluid replacement, and of modern technics in anesthesia in the successful management for war wounds was proved during World War II. Progress in these fields has continued so rapidly during the intervening 5 years that much of the wartime experience has been supplanted by more recent observations. We have chosen therefore chiefly to consider the experience gained in surgical technic during and since World War II. This article results from a study and summary of this material and offers recommendations for treatment based on it.

The treatment for battle casualties may be regarded as having three phases: (1) diagnosis and emergency treatment; (2) early definitive operation; and (3) later definitive operation and the management of complications. These three phases of treatment are performed at echelons in the rearward movement of casualties which vary with the tactical situation and depend on theater evacuation policy. Because the latter are the concerns of military command it is not our purpose to

(1) From the Surgical Service, Fleet Marine Force Evacuation Hospital, and the Department of Urology, Tufts College Medical School and the New England Medical Center, Boston, Mass. This article was presented in part before the Los Angeles Urological Society on 6 February 1951.

(2) Urologist, Fleet Marine Force Evacuation Hospital.

(3) Clinical Professor of Urology, Tufts College Medical School; Chief of Urology, New England Medical Center, and Associate Visiting Urologist, Massachusetts General Hospital, Boston, Mass. Formerly Lieutenant Colonel, A. U. S.

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consider them in detail, but to confine our attention to aspects of the care of the wounded which are primarily matters of surgical judgment.

In genitourinary tract wounds the objective of front line installations is the saving of life. In forward surgical units, urologic treatment is chiefly the emergency management of kidney and bladder wounds and the conservation of tissue in wounds of the external genitalia. In addition, however, it was shown during World War II that primary, definitive treatment of ureteral and urethral wounds, when possible, diminishes subsequent morbidity and disability, and strikingly improves the final result. Because the management of urologic complications and secondary operative procedures for wounds of the urogenital organs are usually undertaken only in hospitals in the rear area where the necessary special equipment is available together with experienced urologists, we have omitted consideration of these problems from the present article. For convenience in discussion, wounds of the kidneys, ureters, bladder, prostate and urethra, and the external genitalia are considered separately.

KIDNEY WOUNDS

Occurrence.—Renal injury occurs in 5 to 7 percent of abdominal wounds and in 10 percent of thoracoabdominal wounds. Twenty percent of 129 kidney wounds reported in the literature were associated with thoracic wounds. Fifty-nine percent of 296 patients with kidney wounds occurred in association with wounds of other abdominal viscera. Wounds thus complicated are more serious than those in which the kidney alone is injured.

Recognition of kidney wounds requires examination for wounds of entry and exit with reference to the cross-sectional anatomy of the region. The presence of ecchymosis, of subcutaneous urinary extravasation, and of urinary drainage through surface wounds must be noted. The urine must be examined for blood when renal injury is suspected in thoracic and abdominal wounds and the patient catheterized if necessary. Catheterization should not be done, however, until facilities for operation are available. Hematuria, gross or microscopic, was reported in from 88 to 100 percent of collected cases. If the major renal injury is to the vascular pedicle, or if the ureter is transected or obstructed by clots, hematuria may not be found.

Roentgenographic examination of the kidneys when possible in the forward area should be made on all patients with suspected renal injury unless severe shock is present. If contrast media are not available, the flat film alone may be studied for such clues to renal injury as haziness of the renal outline, a hematoma mass in the kidney area, obliteration of the psoas outline, or the presence of a foreign body or free gas. When time or help are short or it is not desired to move the patient, the usual methods of excretory urography may be reduced to taking a single roentgenogram after injection of the dye. Most of the

patients are dehydrated when first seen and good dye concentration may be expected. Dye injection may be performed during early triage by a member of the shock team. A roentgenogram is made 15-minutes later; if no dye excretion is apparent, another roentgenogram may be made after waiting 15 minutes more. This roentgenogram may be used to locate foreign bodies and studied for evidence of injury to the skeleton and abdominal viscera. The excretory urogram often permits accurate evaluation of the extent of renal or ureteral damage. Its use is required to determine the presence of a normal kidney on the uninjured side. The incidence of congenital solitary kidney is about 1 in 1,000 persons, and cases of traumatic rupture of a single kidney with fatal outcome because of failure to recognize the anomaly have been reported. Urine and dye excretion may be suppressed in the injured kidney during the first 6 to 10 hours after injury. Urinary suppresion occasionally may occur in both kidneys.

Cystoscopy and retrograde pyelography are valuable supplements in the diagnosis of renal injury but in the field are of limited usefulness and should only be undertaken by experienced operators. Although these procedures are hazardous in the presence of shock or of extensive pelvic fractures, they yield definite, accurate information on the condition of both kidneys and the risk of infection resulting from cystoscopy is slight.

Early definitive operation.—Except in occasional patients with massive hemorrhage, surgical intervention should be delayed until shock has been controlled. Laparotomy is indicated when combined wounds of the kidney and the abdominal viscera are suspected. In such patients, examination of the renal and retroperitoneal regions is required. When delay in making an additional incision is not warranted in order to treat the kidney injury, the kidney may be approached transperitoneally. This operation is more difficult on the right side than on the left. It may occasionally be desirable to close the peritoneum after abdominal exploration, extend the incision laterally, and proceed with retroperitoneal exploration. When the extraperitoneal flank incision is used, this may be made by débriding and extending one of the existing wounds, or a large, new, well-placed incision may be made to assure the best possible exposure of the kidney. The flank incision may be of the classic, oblique, subcostal type or transverse. Both types of incision may be extended anteriorly to permit exploration of the upper abdominal cavity. The twelfth rib may be resected to give wider exposure.

Combined thoracico-abdominal incisions were used successfully for early treatment of kidney wounds with associated intrapleural and intraperitoneal injuries during World War II. The patient was placed in the kidney position under endotracheal anesthesia. Resection of the tenth rib permitted exposure and repair of the lung, kidney, and intraperitoneal viscera. The renal bed was drained when necessary, and the diaphragm closed with separate layers of sutures to its pleural and

peritoneal surfaces. The chest was closed in layers, aspirated immediately after operation and later when necessary. Originally this approach was used on the left side. Subsequently the technic of thoracicoabdominal nephrectomy for use on either side of the body has been developed and described.

Once the kidney has been exposed what is done will depend on the type and extent of damage. A conservative primary operation was possible in 151 of 205 cases collected from reports based on wartime experience. In 126 of these exploration and débridement with drainage or packing were the only maneuvers required. In 25 patients renal repair was possible, and in 54, primary nephrectomy was required. In all cases, débridement and exploration with removal of foreign bodies is necessary. Perforating and penetrating wounds of the kidney without much disorganization may be treated simply by débridement, hemostasis, and drainage. Although packing may be used when necessary for hemostasis, it should be possible in most instances to control bleeding by properly placed sutures.

Lacerated wounds of the kidney should be treated by suture and repair. Even extensive lacerations of the kidney, provided the blood supply and kidney pelvis are intact, may not require nephrectomy. Figure-of-eight or mattress sutures are particularly useful in renal repair and hemostasis. Muscle (high in content of thromboplastic substance), or fat, or the newer chemically refined hemostatic substances may be incorporated in these sutures for hemostatic purposes. With the increasing experience now at hand in vascular anastomoses, suture of the renal vessels is possible and should certainly be tried on suitable wounds of the vascular pedicle. The literature as yet contains no report of the successful use of such methods in war casualties.

Nephrectomy, as primary treatment, should be reserved for patients showing continuing massive hematuria, uncontrollable hemorrhage or urinary extravasation, or for patients in whom operation has revealed massive destruction or infarction of renal tissue. A rising pulse rate is a good indicator of progressive hemorrhage in these patients. Nephrectomy is required for secondary hemorrhage whether it occurs after open wounds or nonpenetrating injuries of the kidney. This grave but comparatively infrequent complication may be expected in the second and third weeks after injury. Bed rest for at least 10 days after injury is required as a prophylactic measure. Nephrectomy is indicated in certain patients with overwhelming infection.

Nonpenetrating kidney injuries.—A large amount of excellent literature concerned with nonpenetrating injuries of the kidney seen in civilian practice has developed in recent years. Because of the increasingly wide use of motorized and armored transport in modern warfare it may be expected that this type of injury will occasionally be encountered in the field. In most patients, injury is caused either by impact of the kidney on the twelfth rib or of the rib on the kidney, depending on the

direction of the blow. All degrees of damage to the kidney, pelvis, and vascular pedicle may occur, from contusion and laceration to extensive rupture and infarction. The typical clinical findings consists of flank pain and hematuria, shock, reflex gastrointestinal disturbances and often a mass in the flank caused by extravasated urine or blood. When intravenous urograms show unsatisfactory definition of the extent of renal damage or reflex anuria, retrograde examination should be made. Conservative treatment has been possible in most of the cases reported. Operation is indicated in the presence of increasing swelling in the flank, continuing massive hematuria, or urographic evidence of severe renal damage. At operation, as in open wounds, hemostasis or repair may often be accomplished without nephrectomy. The indications for nephrectomy parallel those in open kidney wounds: uncontrollable hemorrhage or urinary extravasation, massive destruction or infarction of the kidney, or secondary hemorrhage.

Postoperative observation and complications.—In all patients with renal injury, sustained observation by examination of the urine and intravenous urograms is required after apparent clinical recovery. Complications which have been reported include strictures, intractable urinary tract infection, calculus formation, persistent fistulas, pyonephrosis, hydronephrosis, cystic calcification of hematoma, and ball valve obstruction of the renal pelvis by a bullet. Hypertension, as a late complication of kidney injury, has not been observed. Air blast injuries of the kidney, with renal pain and hematuria but normal excretory urograms, respond to conservative treatment. Kidney and bladder injury caused by underwater concussion has not been observed.

WOUNDS OF THE URETER

Occurrence.—The ureters are deep, of small diameter, and related along their courses to abdominal viscera and the spinal column. Wounds sufficiently destructive to involve them are almost certain to involve other vital structures. Death is likely before the patient reaches the forward hospital.

Recognition.—Hematuria is diagnostic if injury to the kidney and bladder can be excluded and the ureter has not been completely divided or obstructed by clots. Likewise leakage of urine from the wound is a most important sign. Intravenous urograms should be made in all patients with suspected ureteral injury as soon as possible. They will often yield definite information on the extent and location of the ureteral wound, the relative position of foreign bodies, and the degree of associated skeletal damage. Retrograde examination, whether early or late, may be used when necessary and is even more accurate. The Braasch bulb-tipped ureteral catheter, when available, is particularly useful in the production of ureterograms. Before exploratory operation, in a patient with suspected ureteral injury a ureteral catheter should be passed if the patient's condition warrants. Although at laparotomy for abdominal wounds it is sometimes possible to recognize ureteral

injury, the peril of untreated intraperitoneal urinary leakage from a damaged ureter is great and hence exact work-up of patients with suspected ureteral wounds should be completed as early as possible. Extraperitoneal urinary drainage from a damaged ureter appears to be less dangerous to life, even without drainage, than from other parts of the urinary tract. Primary recognition of ureteral wounds was uncommon in the last war, occurring only when a urinary fistula developed in the flank from 7 to 10 days after injury. If wound tracts are blocked by tissue, retroperitoneal extravasation produces a mass in the flank which usually becomes infected.

Early repair of ureteral wounds.—In war wounds of the ureter and urethra alike, best results are obtained by early re-establishment of continuity of the channel over a catheter with diversion of the urinary flow above the injury; local urinary extravasation and infection with resultant scarring are thereby minimized, and stricture formation, ureteral deformities and interference with drainage are less frequent and are more readily managed with sounds when they occur. The technic chosen for re-establishing ureteral continuity must be adapted to the location and extent of damage in each case. Occasionally ureteral wounds which have healed without operative treatment have been reported. In a few patients good results have been obtained merely by leaving a catheter in the ureter for from 3 to 10 days. In most patients, however, early operative repair of the ureter should be undertaken In all such patients diversion of the urinary stream above the injury by pyelostomy or nephrostomy is necessary. Any standard catheter of suitable type may be used for this purpose. The smaller, ureteral splinting catheter, if used, should also be brought out through the renal pelvis or parenchyma. Extraperitoneal soft tissue drainage also is usually required. If sufficient ureteral wall remains, a longitudinal laceration may be treated by simple suture with a splinting catheter left in place.

During and since the war the technic of intubated ureterotomy has been developed. This method should prove to be well adapted for use in war wounds with loss of a longitudinal segment of the ureteral wall. The principle consists in placing a long 12- or 14-gage French soft rubber splinting catheter within the damaged ureter. Pyelostomy is performed, and the catheter left in place for from 4 to 6 weeks. Experimental studies have shown that regeneration of the mucosa and muscularis is complete within this period. Catheters of synthetic plastic materials have recently been found to cause a minimum of tissue reaction and encrustation and should be used if they are obtainable.

Transverse injuries of the ureter require débridement of the injured ends, careful suturing, and a splinting catheter. Diversion of the urine above the anastomosis by pyelostomy or nephrostomy is required, to minimize extravasation. The classic technic of end-to-end anastomosis of the ureter consists of the use of fine, interrupted sutures which do not penetrate the mucosa. Good results were secured in 3 of 5 patients

with war wounds thus treated. The failures were caused by extravasation in one patient and by stricture in the other.

Experimental studies have been reported on a technic of ureteral anastomosis which yielded excellent results. This method, essentially an application of the technic of aortic suture, consists of a continuous, extramucosal, arterial, silk, mattress suture everting the outer edges of the ureter. This development merits trial in suitable patients with war injuries.

Injuries of the lower ureter may require ureterovesical anastomosis. This was performed, after a gunshot wound, as early as 1905. Four patients were reported during the war; good results were obtained in three. It may occasionally be impossible at the first operation to find the end of the ureter, or damage may be too great to permit anastomosis. Temporary nephrostomy, ureterostomy or flank drainage may be performed pending a later reconstructive operation. If necessary, a primary nephrectomy may be performed.

Postoperative observation and complications.—After any type of ureteral injury or repair, prolonged observation for stricture is required, using intravenous and when necessary retrograde urograms. Late complications which have been reported from war wounds include intractable urinary fistulas, hydronephrosis, pyelonephritis, lithiasis or pyonephrosis.

WOUNDS OF THE URINARY BLADDER

Occurrence.—Bladder injury is common in wounds of the lower abdomen, hips, buttocks, thighs, and perineum. Buttock wounds communicating with the bladder were found in from 56 to 75 percent of reported cases. Associated wounds of the lower bowel are the rule rather than the exception. In 70 percent of the 315 bladder wounds on which data could be collected wounds of the small or large intestine, or of the rectum, were present. Purely extraperitoneal wounds are uncommon. Eighty-three percent of 262 patients had intraperitoneal or combined intraperitoneal and extraperitoneal perforations. The prognosis is poorer when intraperitoneal perforations are present. Injury to the bony pelvis is common.

Recognition.—Early recognition and treatment of wounds of the bladder and posterior urethra is of prime importance. Unrecognized or untreated urinary extravasations, with infection, in the peritoneal space or in the retroperitoneal or perivesical tissues is associated with a high mortality rate. The symptoms of bladder perforation are hematuria, prevesical pain, vesical tenesmus, or inability to void. Hematuria was reported in 150 of a group of 155 of these patients. The other symptoms are of relatively little clinical importance, often masked by shock and the multiplicity of accompanying injuries.

In all patients examination for wounds of entry and exit with reference to the cross-sectional anatomy of the region is required; in some,

suprapubic urinary extravasations occur. The abdomen should be palpated for bladder distension. Urinary drainage from a wound in the region of the pelvis is diagnostic of perforation of the bladder or lower ureter. Urinary drainage from the rectum or passage of feces in the urine indicate rectovesical perforation.

Because of the high frequency of intraperitoneal vesical perforations and of associated bowel injury, laparotomy is required in most such patients. The high mortality rate from unrecognized extravasation with peritonitis or retroperitoneal and perivesical cellulitis makes exploratory cystotomy mandatory at the first operation in nearly all of the patients. In a group of 155 patients managed in the forward area on this basis, the correct diagnosis was made preoperatively or at operation in 149.

Although early exploration is usually required, other diagnostic methods are of tried value in the recognition of bladder wounds. First among these is catheterization with a soft rubber catheter and rectal examination with the catheter in place. Catheterization should be withheld, however, until facilities are available for operation. Coexisting urethral wounds occur in association with a high proportion of bladder wounds, and their detection by this means is important. If either the membranous or prostatic urethra is torn, the tip of the catheter hangs and may be located by rectal palpation. The examining finger detects infravesical extravasations of blood and urine. At the same time, extravasation is noted in perineum and scrotum. Successful placement of the catheter within the bladder demonstrates the presence or absence of urinary retention, but failure to obtain urine suggests intraperitoneal perforation.

Roentgenograms of the pelvis when possible in the field should be used on most patients to localize foreign bodies and to disclose damage to the bony pelvis. If ureteral injury is suspected, these films may be obtained with catheter in place. Retrograde cystourethrography with air or a radiopaque medium is a valuable aid in the diagnosis of bladder perforations caused by nonpenetrating pelvic injuries, notably those associated with pelvic fractures. In penetrating wounds, because of the high incidence of intraperitoneal perforation and of associated bowel injury, laparotomy is usually required in any case and cystourethrography may be dispensed with. A measured quantity of physiologic saline solution may be instilled through the catheter and withdrawn to determine if there has been loss of fluid from the bladder through a perforation. This has been recommended in patients with bladder perforation caused by nonpenetrating injuries of the pelvis. The method is probably of limited value in war wounds.

Cystoscopy for diagnosis of bladder perforation in war wounds is not recommended; it contributes to shock in the unanesthetized wounded; it is technically unsatisfactory if intraperitoneal perforation exists; and it is less dependable as a means of diagnosis than is exploratory cystotomy.

Early definitive operation.—The principles of early surgical treatment of bladder wounds are (1) cystotomy for hemostasis; (2) repair of perforations; (3) débridement and drainage of extravasations; and (4) postoperative diversion of urine by suprapubic cystostomy. Intraperitoneal exploration and cystotomy are usually performed through the same lower abdominal incision. If the celiotomy incision for wounds of other viscera is inconveniently located a separate suprapubic incision may be made for cystotomy. In some patients, exploration can be performed after débriding and extending existing abdominal wounds; in others, new exploratory incisions are required.

The bladder is opened and explored. The ureters may be catheterized at this time to assure recognition of lower ureteral injuries. The edges of intraperitoneal perforations are débrided. Intraperitoneal perforations are always sutured. Perforations in the base of the bladder located extraperitoneally are repaired when this is technically feasible. Failure to close the bladder, in the presence of adequate drainage, appears to be of secondary importance though convalescence may be prolonged.

Repair of perforations is made with interrupted sutures of catgut extramucosally placed. If hemostasis is required, sutures may include the full thickness of the bladder wall. The perivesical and prevesical spaces are débrided and drained, through separate incisions if necessary. The consensus is that the prevesical space should usually be drained, though opinion differs on the desirability of this as a routine procedure. If there is coexisting injury of the urethra, an inlying catheter is inserted. Peritoneal drainage, though widely favored during World War I is unnecessary with contemporary chemotherapeutic methods. A large (34-gage French) suprapubic catheter of the Malecot or de Pezzer type is placed high in the dome of the bladder. High position of the tube is necessary to protect the trigone and symphysis. The catheter is brought out along an oblique tract to facilitate subsequent healing.

Most observers during World War II agreed that suprapubic drainage is the safest and most dependable type after repair of bladder perforation. It is particularly necessary when casualties may be evacuated to the rear without assurance of sustained and careful attention to their catheters. Successful use of only an inlying urethral catheter for postoperative drainage has occasionally been reported, though cutaneous urinary fistulas through wounds of entry or exit usually resulted when this method was used. When rectovesical perforation exists, colostomy as well as cystotomy is required.

Blast injury of the bladder was reported in 4 patients who had frequency, urgency and hematuria after being in the vicinity of explosions. All had occult hematuria and showed punctate hemorrhages on cystoscopy.

Postoperative observation and complications.—Cystoscopy and cystography are required in the follow-up observation of patients with

bladder wounds. Complications which have been observed include persistent cutaneous fistulas other than suprapubic, perivesical abscesses, pyelonephritis, deformities caused by scarring, spontaneous stone formation and stone formation about metallic fragments in the bladder wall or within the bladder.

WOUNDS OF THE PROSTATE AND POSTERIOR URETHRA

Occurrence.—Wounds of the prostatic, membranous and bulbous urethra are usually associated with wounds of the abdomen, external genitalia, buttocks, thighs, perineum, bladder, rectum, or bony pelvis. Perforations of the bladder are not uncommonly associated with urethral injuries. Fracture of the pelvis caused by nonpenetrating injury was accompanied by rupture of the bladder or posterior urethra in 15 percent of 1,066 cases collected from reports of civilian experience.

Recognition.—The principal signs of injury or rupture of the posterior urethra are bleeding at the meatus or inability to void if the rupture is complete. Urinary surface drainage, if it occurs, is diagnostic. Diagnosis, when facilities for operation are available, is best accomplished by passage of a rubber catheter with rectal palpation of the urethra over it. Urine cannot be withdrawn though sometimes blood is obtained. Roentgenograms of the pelvis with catheter in place yield necessary information on the condition of the bony pelvis and aid in localizing damage to the urethra. The rectal examining finger detects displacement of the catheter, displacement of the prostate, infravesical extravasations of blood and urine, and adiacent displaced fragments of the bony pelvis. Extravasation of urine from the ruptured urethra into the tissues is more common in small wounds than in large, open wounds which afford free drainage. Extravasations in war wounds may not conform exactly to tissue planes because of disruption of the latter by missiles. In general, perforation of the membranous or prostatic urethra results in extravasation into the perivesical and retroperitoneal spaces or ischiorectal fossa. Rupture below the urogenital diaphragm is likely to result in subcutaneous extravasation into the scrotum, penis, lower abdomen or perineum. Rapid infection of urinary extravasations in these areas is the rule and prompt operation is required.

Early definitive operation.—In all patients, diversion of urine by cystostomy and drainage of extravasation are required. If possible, restitution of urethral continuity should be attempted at the time of first operation. Subsequent urinary extravasation and local sepsis result in scarring and deformity which greatly increase the difficulty of late repair. Strictures developing after primary repair are usually benign, of large caliber, and easily controlled with sounds. Those resulting from treatment by diversion of the urine alone without the use of a splinting catheter are consistently more severe and require secondary operative treatment in a high proportion of patients. The principles of primary treatment are (1) diversion of urine by suprapubic cystostomy, with prevesical and perivesical drainage, to save life; (2) provision of

an inlying catheter to serve as a splint; and (3) some type of surgical approximation of the damaged tissues. A number of refinements of these maneuvers are possible.

Alternative means of restoring urethral continuity at the command of the surgeon are several. In some patients, notably those with partial rupture, a splinting catheter left in place for several weeks is all that is required, in addition to suprapubic drainage, to obtain a good result. In patients of this type in whom the torn urethral ends are separated by upward displacement of the prostate, traction may be placed on a Foley-type catheter. The same objective may be attained by suprapubic suturing of the prostate to the triangular ligament or by placing through-and-through traction sutures through the prostate suprapubically, leading them out beneath the symphysis through the perineal skin behind the scrotum.

If an open perineal wound exists or if the wound involves the bulbous urethra primary perineal repair of the urethra should be attempted, after local débridement, over an inlying catheter. The surgical approach to the bulbous urethra is direct. Approaches to the prostatic and membranous urethra do not differ from those used in perineal prostatectomy. Delayed primary closure or secondary closure of open perineal wounds should be undertaken as soon as possible to minimize scarring and subsequent urethral deformity. If, after perineal débridement, the edges of the urethra are accessible they should be sutured. If this is impossible, the more centrally located periurethral soft tissues may be approximated over the catheter with the expectation of recanalization.

When the urethra is completely severed and its ends can be mobilized and débrided, primary end-to-end anastomosis can be accomplished successfully over a catheter using fine, interrupted, chromic catgut sutures with as little tension as possible. The urethra is covered with as many layers of subcutaneous tissue as possible. Operators familiar with the perineal approach to the prostate may elect to undertake primary repair of the ruptured urethra in the absence of open perineal wounds. These wounds should be drained to prevent localized infection and a 24- or 26-gage French catheter secured in the urethra as a splint. Secondary hemorrhage occasionally complicates urethral repair.

To locate the displaced ends and catheterize the torn urethra a number of expedients have been used successfully. The cŏude rubber catheter, introduced gently, may be valuable. Sounds, one of which may be ground hollow at the tip to engage the other may be introduced through each end of the urethra, after the cystotomy has been performed, and made to meet. The open end or the cut tip of the catheter may be slipped tightly over the tip of one sound and then drawn through the urethra. A Foley catheter on a curved director or a sound may be introduced through the penile urethra with a finger, through the cystotomy, in the prostatic urethra to serve as a guide.

Postoperative observation and complications.—Using sounds or urethrograms, all patients should be observed for stricture after injury. Late strictures may develop if primary urethral repair has not been undertaken or has been unsuccessful. Secondary repair of strictures and excision of fistulas, after establishment of suprapubic drainage, may be planned to suit the requirements of each patient.

WOUNDS OF THE EXTERNAL GENITALIA AND ANTERIOR URETHRA

During initial treatment of wounds of the external genitalia, associated wounds of the urethra, perineum, abdomen, thighs, and hips must not be overlooked. Early treatment consists of hemostasis and conservative débridement. Testicular lacerations, seen early or late, should be debrided and the tunica albuginea closed to prevent herniation and loss of spermatogenic tissue. The testis is always preserved unless its blood supply is destroyed. Anterior urethral injury necessitates the use of an inlying urethral catheter and repair if tears are present. Reconstruction of a damaged corpus cavernosa of the penis or urethra should be attempted as early as possible. Plastic surgical procedures for replacement of skin loss from the penis and scrotum may be performed primarily in favorable cases, or delayed until a clean wound has been obtained by conservative débridement and local treatment.

Osteochondritis Dissecans of an Interphalangeal Joint

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THE radiologic, pathologic, and therapeutic aspects of osteochondritis dissecans have been adequately discussed in the literature. It is our purpose to report a case of a common pathologic process occurring in an extremely uncommon site.

CASE REPORT

A 14-year-old white boy reported to the out-patient service of this hospital on 22 December 1950 complaining of pain and swelling in the

Figure 1.—Lateral aspect of the left thumb showing soft tissue swelling.

interphalangeal joint of the left thumb. About 2 months previously he first noticed pain, limitation of motion, and swelling of this joint. There was no history of trauma or infection. The swelling gradually increased and the subjective symptoms, including tenderness on pressure, became exaggerated.

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Physical examination was negative except for soft tissue enlargement on the lateral aspect of the interphalangeal joint of the left thumb (fig. 1). Flexion of the joint was definitely decreased and pain was elicited by this movement.

Radiographic examination revealed a partially detached shadow of bone density on the lateral aspect of the distal articular surface of the proximal phalanx measuring about 2 by 3 by 3 mm. Around this shadow there was a narrow semilunar band of radiotranslucency. This was observed in the lateral anteroposterior and oblique projections (fig. 2).

On 27 December 1950 an incision was made along the lateral border of the involved joint, carried down through the thickened joint capsule, and the partially detached bone fragment was dissected free (fig. 3). The lateral margin of the articular surface of the bone was removed by means of an osteotome which easily scooped out the involved indented

Figure 2.—(A) Anteroposterior roentgenogram showing partially detached osteochondral body and overlying soft tissue swelling. (B) Lateral roentgenogram showing a shadow of increased density surrounded by zone of decreased density.

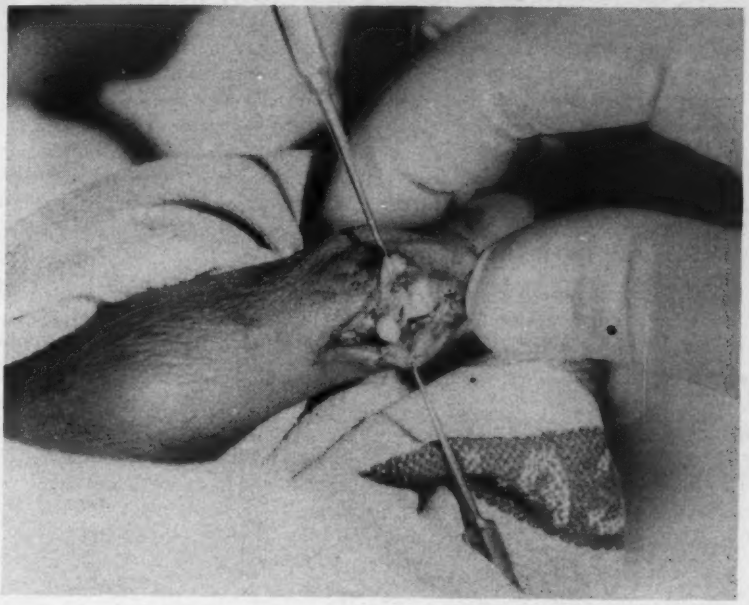

Figure 3.—Osteochondral body reflected from its bed on the head of the proximal phalanx of the left thumb.

base or bed of the lesion. A small sesamoid was also removed even though it appeared quite normal.

The pathologist reported that the section consisted of a small portion of cartilage which was partially surrounded by fibroblastic tissue. Within this there was a small deposit of calcium salt without definite bony structure. There was paling of the cartilage cells suggesting replacement by calcium. Impression: osteochondritis dissecans.

DISCUSSION

We were interested in this case because neither of us had seen a case of osteochondritis dissecans occurring in an interphalangeal joint and because the clinical entity was causing the patient great distress. Reference to texts at hand failed to disclose any report of the condition occurring in an interphalangeal joint. Brailsford (2) stated: "Though this lesion is most commonly encountered in the articular surface of the medial femoral condyle (often slightly posterior to the midline) the author has observed it in the lateral condyle, the patella, the femoral capital epiphysis, the capitellum, the head of the

(2) Brailsford, J. F.: The Radiology of Bones and Joints. 4th edition. Williams & Wilkins Co., Baltimore, Md., 1948. p. 197.

radius, the humerus, the navicular, the astragalus, the first metatarsal and the lower end of the tibia." Hutchison *(3)* reported a case in which the lesion occurred in the base of the proximal phalanx of the great toe, but failed to find a similar case recorded in the literature. Lavner *(4)* reviewed the literature and analyzed 42 cases of his own, including a case in which the lesion involved the base of the proximal phalanx of the great toe. Neither of these lesions, both of which involved the metatarsophalangeal joint of the great toe, reported by Hutchison or Lavner was proved to be osteochondritis dissecans at operation, but the radiographic appearance was so typical of this disease that contradiction is precluded.

Our case, in which complete clinical relief was obtained with the removal of the necrotic lesion and débridement of the site of occurrence, is offered as a heretofore unreported site for osteochondritis dissecans.

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(3) Hutchison, R. G.: Osteochondritis dissecans; records of some unusual cases. Brit. J. Radiol. 16: 147-149, May 1943.

(4) Lavner, G.: Osteochondritis dissecans; analysis of 42 cases and review of literature. Am. J. Roentgenol. 57: 56-70, Jan. 1947.

Asymptomatic Active Pulmonary Tuberculosis

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THE data on 1,188 patients with active pulmonary tuberculosis admitted for treatment to a sanatorium are herewith analyzed in terms of discovery of the disease—by traditional symptoms, or by routine roentgenograms of the chest—and reveal significant findings concerning asymptomatic active pulmonary tuberculosis. The modern approach to the control of pulmonary tuberculosis is based on the discovery and isolation of epidemiologically significant cases; and the work of public health agencies has been handicapped for decades by the frequent occurrence of asymptomatic pulmonary tuberculosis. This dangerously subtle aspect of the disease has emphasized the value of the photofluorographic approach to case finding. This study compares patients initially diagnosed on the basis of routine roentgenograms of the chest with those initially diagnosed by symptoms, with respect to (1) degree of tuberculosis as visible in roentgenograms, (2) admission to hospital purely as a consequence of routine roentgenographic examination of the chest, and (3) frequency of occurrence of specific symptoms. Patients discovered by routine roentgenograms include a higher proportion of the minimal type of the disease than do those admitted on the basis of symptoms.

SOURCE OF DATA

All patients here reported were veterans of the Navy and the Marine Corps. Their ages ranged from 17 to 40 years; the mean age was from 20 to 25. The duration of their military service ranged from 6 months

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to 5 years. Nearly all had been inducted into the services in World War II and had been accepted as free from disease on the basis of physical examination and a roentgenogram of the chest. A few patients had developed tuberculosis in Japanese prison camps after prolonged inadequate diet and exposure to an extremely adverse environment, but most of the patients had received an excellent diet and sufficient rest, although military exigencies frequently necessitated crowding of personnel. All patients were hospitalized for treatment at the U. S. Naval Hospital, Sampson, N. Y., during 1945 and 1946. They are analyzed in two main groups: Group I was composed of 859 patients admitted in consequence of routine roentgenograms of the chest. This examination usually was preliminary to discharge from military service. Group II was made up of 329 patients admitted because of symptoms. Most of them had been on active duty.

All patients were reviewed and classified according to standards established by the National Tuberculosis Association. All case histories and roentgenograms were studied by several staff members to facilitate uniformity in diagnosis. Only patients admitted with active disease are included.

Table 1 indicates a shift in the type of patient admitted to sanatoriums in the United States. Formerly sanatorium reports underscored the fact that 80 percent or more of admissions fell in the moderately advanced or far advanced categories. Studies of routine roentgenographic surveys reveal that this case-finding technic brings in an increased proportion of patients with minimal disease. Use of this technic should ultimately be reflected in tuberculosis morbidity and mortality rates because potential sources of infection would be removed from the general population in the early stages of the disease. It is hoped that discovery and treatment of such patients with minimal disease will reduce the death rate among tuberculous patients.

TABLE 1.—*Basis of hospital admission and classification**

Quantitative classification	Basis of hospital admission			
	Routine roentgenogram (Group I)		Symptoms (Group II)	
	Number	Percent	Number	Percent
Minimal	312	36.3	55	16.7
Moderately advanced	432	50.3	175	53.2
Far advanced	115	13.4	99	30.1
Total	859	100	329	100

*1940 National Tuberculosis Association Standards

ASYMPTOMATIC ACTIVE PULMONARY TUBERCULOSIS

Until the past decade, necessary dependence on development of symptoms to establish a diagnosis of tuberculosis left much to be desired. The prevalence of asymptomatic active tuberculosis is indicated by further subdivision of Group I as shown in table 2. Totally asymptomatic patients will be referred to as Group IA and those in whom symptoms which had not been interpreted properly were present will be referred to as Group IB. In view of the fact that 80 percent of the asymptomatic patients had either moderately or far advanced disease, a brief review of the mechanisms of symptom production is pertinent. Like most tissues and organs, the lungs exhibit tremendous functional reserve. This fact is emphasized, not only by observers of pulmonary disease, but also by thoracic surgeons who obliterate or remove a large portion of functional pulmonary tissue without appreciably disabling the patient. In most instances the lesions and the pathologic physiology of pulmonary tuberculosis develop slowly. This could be expected from the inherent characteristics of the *Mycobacterium tuberculosis* and the natural resistance of most human beings to it.

TABLE 2.—*Admissions by routine roentgenographic examination (Group I), classified quantitatively and by presence of symptoms*

Group I	Quantitative classification							
	Minimal		Moderately advanced		Far advanced		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Asymptomatic (Group IA)..	188	60.2	203	46.9	38	33	429	50
Symptomatic (Group IB)..	124	39.8	229	53.1	77	67	430	50
Total..	312	100.0	432	100.0	115	100	859	100

In a given tuberculous patient, symptoms depend on (1) local disturbance of pulmonary tissue and pulmonary function and (2) systemic reaction to metabolites from the infection. The indolent nature of developing pulmonary tuberculosis allows time for some adaptation of tissue to occur. The dilatory nature of this disease, the adaptability of living tissue to the disease, and the tremendous functional reserve of the lungs account for failure or delay in the development of symptoms from tissue alteration caused by the disease. Because the multiple bronchial drainage from all areas of the lungs allows expectoration of the tuberculous exudate, the retention of metabolites of the infection is decreased and systemic reaction to the disease is postponed. Table 3 shows the distribution of symptoms in Group I.

TABLE 3.—*Distribution of symptoms in Group I*

Symptom	Quantitative classification					
	Minimal (312 patients)		Moderately advanced (432 patients)		Far advanced (115 patients)	
	Number	Percent	Number	Percent	Number	Percent
Cough	95	30.4	166	38.4	70	60.9
Loss of weight	35	11.2	99	22.9	48	41.7
Fatigue	14	4.4	28	6.5	15	13.0
Night sweats	5	1.6	21	4.9	15	13.0
Chest pain	18	5.8	38	8.8	14	12.2
Hemoptysis	14	4.4	27	6.2	9	7.8
Anorexia	5	1.6	12	2.8	5	4.3
Weakness	5	1.6	6	1.4	2	1.7
Pleurisy with effusion	8	2.6	9	2.1	2	1.7

The high percent of patients with significant symptoms in which the patient was unaware of his condition until the routine roentgenogram of his chest was made is astonishing. Inquiry concerning the patients' apparent disregard of symptoms elicited numerous rationalizations, such as (1) cigarette cough, (2) sinus trouble, (3) bad air, (4) damp air, (5) poor ventilation, (6) poor food, (7) poor preparation of food, (8) hot living and working compartments, (9) overwork, (10) poor dining facilities, (11) nose bleed, (12) bleeding gums, (13) strain, (14) colds, (15) grippe, and (16) fear of not being released from the military service. In nearly every instance the patient apparently reported honestly that he did not regard his symptoms as sufficiently important to require medical advice. For comparison table 4 shows the symptoms of the patients of Group II who sought medical aid and were thereupon hospitalized.

TABLE 4.—*Distribution of symptoms in patients admitted on basis of recognized symptoms (Group II)*

Symptom	Severity of disease					
	Minimal (55 patients)		Moderately advanced (175 patients)		Far advanced (99 patients)	
	Number	Percent	Number	Percent	Number	Percent
Cough	41	74.5	151	86.3	90	90.9
Loss of weight	19	34.5	85	48.6	66	66.7
Fatigue	11	20.0	51	29.1	29	29.3
Night sweats	6	10.9	30	17.1	21	21.2
Chest pains	27	49.0	81	46.3	51	51.5
Hemoptysis	16	29.0	77	44.0	37	37.4
Anorexia	5	9.0	22	12.6	12	12.1
Weakness	5	9.0	20	11.4	12	12.1
Pleurisy with effusion	9	16.4	8	4.6	1	1.0

TABLE 5.—*Comparison of percent of patients in Group IB and Group II showing various symptoms*

Symptom	Quantitative classification					
	Minimal		Moderately advanced		Far advanced	
	Group IB (124 patients)	Group II (55 patients)	Group IB (224 patients)	Group II (175 patients)	Group IB (77 patients)	Group II (99 patients)
Cough	76.6	74.5	74.1	86.3	90.9	90.9
Loss of weight	28.1	34.5	44.2	48.6	62.3	66.7
Fatigue	11.3	20.0	12.5	29.1	19.5	29.3
Night sweats	4.0	10.9	9.4	17.1	19.5	21.2
Chest pain	14.5	49.0	16.9	46.3	18.1	51.5
Hemoptysis	11.3	29.0	12.1	44.0	11.7	37.4
Anorexia	4.0	9.0	5.4	12.6	6.5	12.1
Weakness	4.0	9.0	2.7	11.4	2.6	12.1
Pleurisy with effusion	6.4	16.4	4.0	4.6	2.6	1.0

Patients in Group IB showed rather close correspondence in the incidence of specific symptoms with patients in Group II, as shown in table 5.

CONCLUSIONS

Of 859 patients discovered by routine roentgenograms of the chest, 50 percent were asymptomatic; 36.3 percent were classified as minimal whereas only 16.7 percent of those hospitalized on the basis of symptoms were so classified. Of the patients discovered by routine roentgenograms, 50 percent had symptoms which were not recognized by them as significant.

Of those recognized by routine roentgenograms, asymptomatic patients constituted 60.2 percent of the minimal cases, 46.9 percent of the moderately advanced, and 33 percent of the far advanced. The symptoms manifested by the patients conformed to the expectations of current opinion. Public health programs directed to discovery of unrecognized tuberculosis should be continued and expanded. The lay public requires further education in the significance of symptoms.

Damage to the External Iliac Artery

Report of a Case

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THE literature is filled with case reports of satisfactory surgical results. Only occasionally does the poor result or the surgical error find its way into the literature. A report of poor results and surgical errors and the means used to correct them is invaluable because it adds to the surgical armamentarium and may serve to prevent death or disability.

CASE REPORT

A 22-year-old white soldier, was admitted to this hospital for repair of a left indirect inguinal hernia of about 18 months' duration. He was taken to surgery on 24 January 1951 at which time a hernia repair using Cooper's ligament was undertaken by another member of the surgical service. During suture of the transversalis fascia to Cooper's ligament, the external iliac artery just proximal to the inguinal ligament was inadvertently torn by the suture needle. Pressure over the puncture failed to control bleeding, so the vessel sheath was opened, revealing a 2 mm. laceration of the artery. Because pressure with oxycel gauze for 5 minutes failed to control bleeding, one of us (H. H. Z.) was called on for assistance. The iliac artery above and below the tear was isolated and circled with two moistened umbilical tapes to control hemorrhage. In the absence of arterial suture, a 6-0 eye suture with a swaged-on cutting edge needle was used to place a single everting mattress suture through the rent in the arterial wall. Release of the umbilical tapes above and below this point revealed no bleeding from the rent but a small amount of bleeding was noted at the site of entry of the everting suture. This was easily controlled by oxycel gauze placed against the arterial wall.

Inspection of the involved segment of iliac artery before closure revealed a marked degree of segmental spasm but pulsations of the

(1) U. S. Army Hospital, Fort Dix, N. J.

femoral artery were noted below the inguinal ligament. The dorsalis pedis pulsations were palpable in both feet and the skin temperature and color of both feet were equal. The patient was returned to the convalescent ward where shock blocks were placed under the head of the bed. Four hours after operation, intermittent heparinization was begun by the intravenous injection of 50 mg. of heparin every 4 hours. The clotting time was checked at intervals by the Lee and White method and varied from a normal of 9 minutes to a maximum of 66 minutes (the average maximum being about 33 minutes). Maximums above 30 minutes were reduced by intravenous injection of 5 cc. (50 mg.) of protamine sulfate.

About 5 hours after the return of the patient to the ward, it was noted that his left foot was markedly colder and paler than the right and that the previously palpable left dorsalis pedis pulsation was absent. Using the technic described by Curbelo *(2)* a peridural block was accomplished. A 16-gage Touhy needle with a Huber point was used to introduce a 3.5-gage French ureteral catheter (x-ray type) into the peridural space between the twelfth thoracic and the first lumbar vertebras with the patient in the lateral recumbent position and his back acutely arched. The only modification of the original technic was that a syringe filled with air instead of fluid was used to indicate when the spinal needle entered the peridural space. Theoretically a negative pressure is set up in the peridural space with the patient's back acutely flexed. A change is noted in the compressibility of the air in the syringe when the peridural space is entered. The technic is similar to a subarachnoid tap except that the needle is advanced only a millimeter at a time in order not to pierce the dura. Once it has been ascertained that the needle has entered the peridural space, the ureteral catheter is inserted in a cephalad direction (this is facilitated by the Huber point on the needle), and the needle is withdrawn. The catheter is then taped in place with adhesive, a 23 or 24 gage needle is inserted into the catheter, and a test dose of about 8 cc. of Curbelo's anesthetic solution *(3)* is injected in order to be certain that the catheter has not pierced the dura. If no motor paralysis ensues, then an additional 32 cc. of the solution is injected after waiting 5 minutes. About 10 minutes after the second dose, the patient noted paresthesias in both legs and feet and said that he felt as if he had just entered from a cold surrounding and placed his feet close to a warm radiator. The color of the affected foot became pinker and there was a noticeable increase in its temperature. The affected foot was not, however, as warm as the unaffected foot. Within 1 hour skin temperatures of both feet were equal. After 2 hours the affected foot and leg gradually cooled until they began to show blanching. No dorsal pedis or posterior tibial pulsation was pal-

(2) Martinez Curbelo, M.: Continuous peridural segmental anesthesia by means of ureteral catheter. Anesth. & Analg. 28: 13-23, Jan.-Feb. 1949.

(3) This is made up by mixing 800 mg. of crystalline procaine, 40 mg. of pontocaine (4 cc. of 1 percent pontocaine), 0.5 cc. of 1:1,000 epinephrine and 36 cc. of distilled water or saline solution. The resultant volume is 40 to 45 cc. of anesthetic solution.

pable. After 3 hours, a second dose of Curbelo's mixture was administered. Although no pulses were palpable in the left leg and foot, venous distention was equal bilaterally and the skin temperature of both extremities was nearly equal. No motor paralysis occurred although sensory changes (anesthesia and hypalgesia) extended to the nipple line. Five hours after the second dose, the foot had cooled again and it became apparent that it would become necessary to establish continuous rather than intermittent sympathetic paralysis.

A solution of 5 percent dextrose in distilled water was therefore made up with 0.4 percent procaine and 0.01 percent pontocaine. This solution was connected to the peridural catheter with a standard intravenous drip-bulb apparatus and a flow rate of about 35 drops per minute was established. At the end of 4 hours, 500 cc. of solution had flowed into the peridural space. The patient complained of burning of both feet and of backache. It was presumed that the latter was caused by pressure in the peridural space. The drip was slowed to about 10 drops per minute and within 30 minutes the pain had subsided. A regimen was established wherein the drip would be speeded up until the foot was appreciably warmed and then the rate of flow would be reduced. This continuous drip was maintained for 4½ days. During this time a weak dorsalis pedis pulsation was only intermittently palpable on the left. At no time in this period was the posterior tibial pulsation palpated. On removal of the catheter the patient was allowed to walk. On ambulation the posterior tibial pulsation became weakly palpable and the skin temperature, skin color, and venous distention were equal bilaterally.

The ureteral catheter was left in place for nearly 5 days. During this period, 4 liters of dilute Curbelo's solution and a total of 17.4 grams of procaine and 480 mg. of pontocaine were given in 2 doses. The patient vomited on two occasions, probably because of the toxic effect of the procaine. The vomiting was easily controlled with 0.25 gram of sodium amytal intravenously.

This patient returned from convalescent furlough on 24 February 1951 at which time there was no evidence of arterial pulsation below the iliac artery on the left. His skin temperature was equal in both feet. His skin color and venous distention were likewise equal bilaterally, but he complained of moderate cramping of the left calf and thigh on long or rapid walking.

DISCUSSION

Postoperatively all efforts in this case were directed toward control of arterial spasm and the prevention of thrombosis at the site of arterial injury. That arterial spasm was present was proved by the fact that it was seen during the operation, in spite of the vasodilating action of the spinal anesthetic, and by the marked changes which occurred in the affected foot and leg when the spinal anesthetic wore off. Heparinization to prevent thrombosis may be performed either intermittently or

continuously. Continuous heparinization may be accomplished either with a continuous drip of heparin, by heparin in Pitkin's menstruum, or with depo-heparin. All of these methods are equally effective but the latter two and intermittent heparinization are more easily accomplished.

In order to overcome the obvious segmental arterial spasm, several methods of treatment were considered. These were paravertebral block of the affected side, continuous caudal block, or continuous peridural block. The latter was finally decided on because continuous sympathetic paralysis without muscle paralysis is produced by this method, because peridural block requires a smaller volume of solution to produce a higher level of sympathetic paralysis than with caudal block, and because the sensory anesthesia associated with peridural block is definite proof of sympathetic paralysis. No such proof of sympathetic paralysis exists when performing a paravertebral block. The rationale of peridural anesthesia in vasospastic conditions was suggested by Blanchard in a personal communication to Frumin and Apgar *(4)* in which he stated that he maintained functional sympathectomy in animals by continuous peridural block.

Failure to maintain adequate arterial circulation through the femoral artery in this case can be explained only by progressive thrombosis occurring at the site of injury associated with continued arterial segmental spasm. The collateral arterial circulation was dilated by the peridural block as proved by the bilaterally equal skin temperatures, skin color, and venous distention. The presence of only intermittent pulsations of the arteries of the feet showed that segmental spasm continued to exist. According to Shumacker *(5)* there are some instances in which functional sympathectomy fails to relieve such segmental arterial spasm because of the capacity of the arterial muscular coats to contract as a result of local stimuli independent of sympathetic innervation. Had peridural block been continued for a longer period, the segmental arterial spasm might ultimately have been relieved and the femoral arterial system would have remained patent. As it was, the collateral circulation was dilated by this functional sympathectomy allowing adequate circulation to the left foot and leg in spite of femoral thrombosis.

SUMMARY

A technic is described by which a functional sympathectomy was maintained for 4½ days in a patient who had a laceration of the external iliac artery with resultant spasm. No marked untoward affects were noted either physiologically or anatomically during or after the pro-

(4) Frumin, M. J., and Apgar, V.: Continuous segmental epidural anesthesia with catheter via caudal canal; preliminary note. Anesthesiology 10: 733-735, Nov. 1949.

(5) Shumacker, H. B., Jr.: Treatment of acute arterial occlusion. Quart. Bull. Indiana Univ. M. Center 13: 7-11, Jan. 1951.

cedure. It is hoped that the procedure will receive greater usage in the future in vasospastic conditions of the lower extremity especially following vascular operations. One of the authors (V. DeC.) has used the technic on several occasions in patients with arterial emboli of the lower extremity and in several with phlebitis. It is suggested that this procedure be used in patients with frostbite of the lower extremity because intense vasodilatation is produced. This technic may easily be combined with a bilateral continuous stellate ganglion block in patients who have frostbite of the upper and lower extremities.

Dental Disease and Endocrinopathy

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ORAL manifestations of endocrine dysfunction often may be observed initially by the dentist. The hyperplastic teeth of the cretin and the tendency of the diabetic patient toward pathologic dental changes are well known. It is the duty of the dentist and oral surgeon always to be on the lookout for patients with endocrine disturbances. Objective manifestations such as: exophthalmos in hyperthyroidism, obesity in diabetes, and a protrusive, massive jaw in acromegalia are easily recognized. The products of the endocrine glands exercise control over each other and also exert a tremendous influence on other organs. Thus the thyroid gland, whose hormone, thyroxin, influences the metabolic processes of the body, is under the control of the pituitary gland. In diabetes four glands are involved: the pancreas, the adrenal, the thyroid, and the pituitary. The concept of correlated activity involving tissues remote from each other applies to all endocrine glands (2).

After this general introduction we may consider the effects of over- and under-secretion of each endocrine gland separately, showing its influence on the development and maintenance of the health of the teeth and their supporting structures. Dentistry plays a minor role in the pathologic changes in the endocrine glands, yet some knowledge of the pitfalls besetting the unsuspecting dentist or oral surgeon is necessary so that he may determine the proper treatment of oral manifestations of endocrine disease. Curettage of cystic cavities in the mandible as found in hyperparathyroidism is definitely contraindicated. Operation, no matter how simple, in diabetes mellitus without proper preliminary medication is dangerous. A knowledge is required of many other diseases in this category that occasionally come to our attention.

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(1) U. S. S. *Cabot.*

(2) Sevringhaus, E. L.: Endocrine Therapy in General Practice. 5th edition. Year Book Publishers, Inc., Chicago, Ill., 1945. p. 14.

PITUITARY

It has been proved by many authorities that removal of the pituitary in the dog results in delayed eruption of the teeth, short roots, and wide pulp chambers. The foramina at the apex were also found to be comparatively wider than those found in the normal dog. Eosinophilic adenoma or hyperplasia of the adenohypophysis in the adult produces acromegaly. Although the mandible increases in size to a decided prognathism, the size of the teeth remains unchanged. Dental plaster casts, as well as repeated roentgenograms of the jaw, will show the progress of the disease (figs. 1 and 2). Hyperactivity of the anterior lobe of the pituitary

Figure 1.—Roentgenogram of a man with acromegaly.

leads to renewed growth of the body and overgrowth of the entire skeleton, particularly the supra-orbital ridges, frontal sinuses, and the lower jaw. The teeth are widely spaced and mastication becomes difficult; the administration of a general anesthetic is exceedingly dangerous; and the tongue becomes enlarged and the thymus gland, which under normal conditions undergoes atrophy after puberty, continues to grow and may interfere with normal breathing. Persons with acromegaly usually develop diabetes in the later stages of the disease *(3)*.

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(3) Goldberg, M. B., and Lisser, H.: Acromegalia; its course and treatment. J. Endocrinol. 2: 447-501, Aug. 1912.

Figure 2.—The same patient, 8 years later. Note growth of mandible, particularly at the ramus.

THYROID

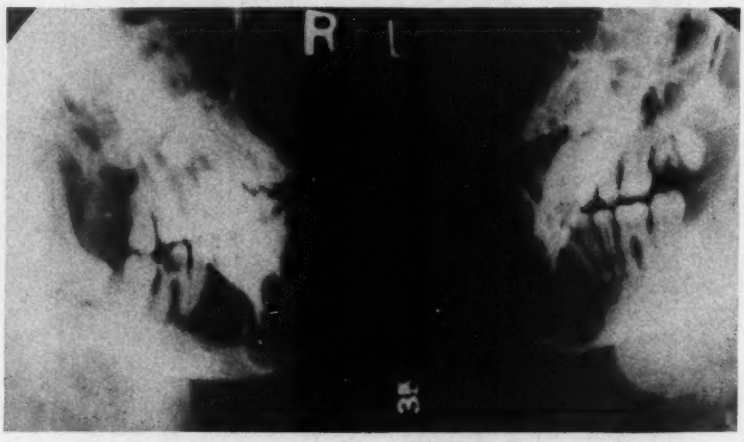
Hypothyroidism may be congenital in origin and is characterized by premature ossification of the bones, particularly those at the base of the skull. In children the bones of the face, especially the jaw and nasal bones, show a generalized retardation of growth, and dental caries is prevalent. Dentition is delayed, but the size of the teeth is not affected so that the teeth and the alveolar processes seem to be over large for the mandible and maxilla. The teeth are poorly formed and irregularly placed in the dental arch. Supernumerary teeth are present. Two rows of teeth may be seen. The head appears too large for the body and the cranium is relatively larger than the face. Bone development can be altered by early treatment in these patients. In those treated from early childhood craniofacial and dental development closely approach normal (4).

PARATHYROIDS

The parathyroids are concerned with the calcium and phosphorus metabolism, and these substances are necessary for the calcification

(4) Engel, M. B.; Bronstein, I. P.; Brodie, A. G.; and Wesoke, P.: Roentgenographic cephalometric appraisal of untreated and treated hypothyroidism. Am. J. Dis. Child. 61: 1193-1214, June 1941.

of the bones and teeth. In hyperparathyroidism calcium is not withdrawn from the teeth because resorption of calcium from a fully-formed tooth cannot occur. Hypersecretion of the parathyroid gland, caused by a tumor or hyperplasia, is the etiologic factor in the formation of bone cysts in the skeletal structures. Resch (5) noted that a child born of a mother with hyperparathyroidism readily developed caries and early loss of the deciduous teeth. This in turn resulted in malocclusion of the teeth with altered jaw development. Strock (6) stated that, in ex-



—Courtesy of Leroy M. Ennis, D. D. S.

Figure 3.—Characteristic condition of hyperparathyroidism of mandible. A cystic area which closely resembles cysts of dental origin is shown.

treme demineralization of hyperparathyroidism, dental caries does not increase. This indicates that the resorption of calcium and phosphorus from mature teeth by way of the blood stream does not occur to a significant degree.

The oral manifestations of hyperparathyroidism may result in an early recognition of this disease. The dental signs are cysts of the jaw, osteoporosis, closely meshed trabeculas, and absence of the lamina dura around the roots of the teeth (figs. 3 and 4). In roentgenograms the lamina dura appears as a white line close to the black line which represents the periodontal membrane. The lamina dura should be examined for breaks in continuity because any roughening of its surface is indicative of a pathologic process. Erdheim (7) noted that, in parathy-

(5) Resch, C. A.: Dental findings in hypoparathyroidism in relation to patient and progeny; report of case. Cleveland Clin. Quart. 14: 147-152, July 1947.

(6) Strock, M. S.: Mouth in hyperparathyroidism. New England J. Med. 224: 1019-1023, June 12, 1941.

(7) Erdheim: In Selye, H.: Textbook of Endocrinology. Universite de Montreal, Montreal, Canada, 1948. p. 555.

roidectomized rats, dentine that formed after the removal of the gland failed to calcify and the enamel was hypoplastic and irregular. The lack of dentine calcification is so characteristic of parathyroid insufficiency that it has been employed as an indicator in the bio-assay of the parathyroid hormone. If a parathyroidectomized rat is treated repeatedly,

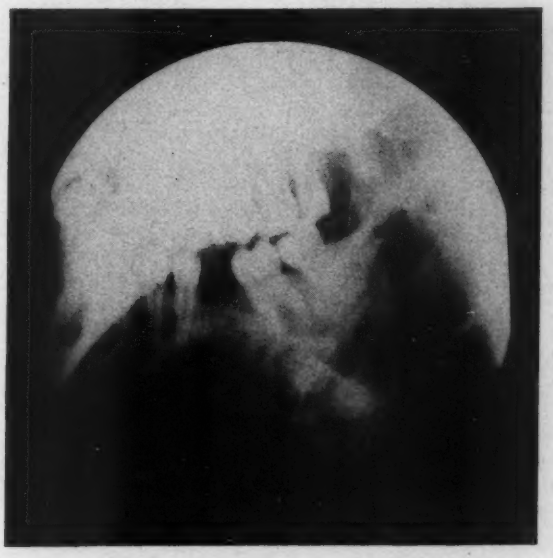


Figure 4.—Hyperparathyroidism (osteitis fibrosa cystica). The mandible with cyst formation is shown.

at short intervals, with small doses of parathyroid hormone, rings of calcification corresponding to the treatment appear within the otherwise uncalcified dentine. When skeletal involvement is present, high levels of alkaline phosphatase may also be observed. Roentgenograms will reveal a generalized osteoporosis. Pathologic fractures occur frequently. The compact bone of the mandible is decalcified. In addition, there is definite thickening of the cortex of the mandible and large brown tumors, composed of giant cells and cysts, are present. The marrow of the bone is replaced by fibrous tissue in large areas.

PANCREAS

The pyorrheal teeth and gums of the diabetic patient are characteristic. A heavy calculus formation occurs around the necks of the teeth, the teeth become very sensitive because of the destruction of Sharpey's fibers and, as a consequence, the periodontium is parted, exposing the

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roots of the teeth (8) and giving rise to periodontal disturbances. A ready flow of pus from the gingivas and through the dental papilla is noted. The gingivas become swollen and painful; the breath foul. Onset of gingivitis may be acute and the loosening of the teeth rapid. The tongue is deeply fissured, sometimes swollen and inflamed. The susceptibility of a diabetic patient to pyorrhea is a common characteristic.

Proper medical treatment sometimes will eliminate the need for a dental operation, but the need for oral hygiene is always present and is important. Under appropriate treatment the teeth may tighten in their alveoli and the inflammatory processes around the gingivas may abate, but excessive deposits of calculus will persist and continued strict dietary control and proper therapy are required. Recent studies have shown that there are at least a million persons in the United States with undiagnosed diabetes. Hence, dentists must always watch for these asymptomatic patients. Routine urinalysis should be performed preoperatively, even if only a minor operation is contemplated. Dental caries is less prevalent in the diabetic than in the nondiabetic patient, but pyorrhea is much more frequent in patients with diabetes.

Beardwood (9) discussed in detail the role of dentistry in diabetes and listed six points to be considered before performing a dental operation: (1) the patient should be under the care of a physician; (2) local anesthesia should be used whenever possible, although, nitrous oxide-oxygen inhalation anesthesia is comparatively safe; (3) epinephrine should not be used, for it is directly antagonistic to insulin and raises the blood sugar; (4) aseptic technic should be observed as diabetic patients are very prone to infection; (5) unnecessary trauma should be avoided; and (6) extensive dental treatment should be given in stages.

GONADS

The noticeable increase of caries during puberty, pregnancy, and lactation has been attributed to endocrine dysfunction. The concept that, in pregnancy, calcium can be withdrawn from the fully-formed tooth is erroneous, but changes in the gingivas do occur in puberty, pregnancy, and just prior to menstruation. If oral hygiene is maintained the gingivas should return to normal at the end of these periods. Congestion and bleeding of the gingival tissues have been observed in association with gynecologic distrubances (10). In women who freckle and burn rather than tan when exposed to the sun's rays, the gingivas may bleed after brushing, and excessive bleeding may occur after extractions and minor operations. When no blood dyscrasia is present

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(8) Prinz, H., and Greenbaum, S. S.: Diseases of the Mouth and Their Treatment. 2d edition. Lea & Febiger, Philadelphia, Pa. 1939.

(9) Beardwood, J. T.: Role of dentistry in management of diabetes mellitus. Dental Cosmos 75: 879-883, Sept. 1933.

(10) Stoloff, C. J.: Periodic transitory meno-gingivitis incidental in women. J. Dent. Research 13: 190, 1933.

this condition is suggestive of an endocrine disturbance *(11)*. Dental caries and pigmentation of the gingival tissues in women are suggestive of an ovarian deficinecy *(12)*. Ziskin et al. *(13)* produced hyperplasia of the gingival tissues following injection of estrogens experimentally in monkeys. The work of Ziskin et al. *(14)* on the effects of estrogens on the oral tissues has stimulated much interest in this phase of endocrinology.

Accelerated tooth eruption occurs in the very young with hypergenitalism. Complete dentition is reported to have occurred in 1-year-old infants with loss of deciduous teeth and replacement by the permanent set by the end of the third year *(15)*. This condition (precocious puberty) is found in boys and may be caused by a testicular interstitial cell tumor *(16)*. Secretion from the interstitial cells of the testes accelerates growth and development, and premature calcification may occur. Karnaky *(17)* reported a case of sexual precocity in a girl, 4 years and 11 months of age. The body development was that of a 12-year-old girl but the eruption of the teeth was unaffected and the deciduous teeth were all normal and intact. An ovarian tumor was found.

ADRENAL

Accelerated dentition may occur in association with adrenal tumor *(18)*. Retarded dental development has followed hypofunction of this gland *(19)*. The dark pigmentation of the mucosa of the mouth and the bronzelike appearance of the skin over the entire body is characteristic of Addison's disease. Dental disease in such patients should not be treated by the dentist alone *(20)*. According to Soffer *(21)*, pigmentation, if not a racial characteristic, is indicative of Addison's disease. Tooth extraction in an untreated patient may provoke an adrenal crisis with severe dehydration and shock. Patchy pigmentation

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(11) Lucia, S. P., and Aggeler, P. M.: Simple easy bruisability; pseudohemorrhagic diathesis of probable endocrine origin. J. Clin. Endocrinol. 2: 457-459, July 1942.

(12) Rocco, F.: Estrogens and Pigmentation. Institute de Montevideo, Montevideo, Uruguay.

(13) Ziskin, D. E.; Blackberg, S. N.; and Stout, A. P.: Gingivae during pregnancy; experimental study and histopathological interpretation. Surg., Gynec. & Obst. 57: 719-726, Dec. 1933.

(14) Ziskin, D. E.; Zagarelli, E. V.; and Sennetz, C.: Estrogen implant in dog; preliminary report. Ann. Orthodont. 33: 723-739, Oct. 1937.

(15) Schour, I.: Endocrines and teeth. J. Am. Dent. A. 21: 322-328, Feb. 1934.

(16) Werner, A. A., and others: Pubertas precox in 6-year-old boy produced by tumor of testis, probably of interstitial cell origin. J. Clin. Endocrinol. 2: 527-530, Aug. 1942.

(17) Karnaky, K. J.: Premature sexual precocity in young girl. J. Clin. Endocrinol. 5: 184-188, Apr. 1945.

(18) Fialta, W.: Endocrine Diseases. The Blakiston Co., Philadelphia, Pa.

(19) Wisel, J.: Handb. d. norm. u. path. Physiol. 553: 16, 1930.

(20) McGavack, T. H.; Benjamin, J. W.; Speer, F. D.; and Klotz, S.: Malignant pheochromocytoma of adrenal medulla (paraganglioma); report of case simulating carcinoma of adrenal cortex with secondary adrenal insufficiency. J. Clin. Endocrinol. 2: 332-338, May 1942.

(21) Soffer, L. J.: Oral manifestations of endocrine disease. Ann. Dent. 5: 34, June-Sept. 1941.

of the mucosa within the mouth is not a constant sign in Addison's disease, but when present is of great diagnostic value. It is seen on the lips, inner aspects of the cheeks, gums, hard palate, and uvula. Spotty pigmentation may be seen on the tongue in some patients. There are other diagnostic criteria, but the most striking and characteristic is the general pigmentation of the skin which should invoke the suspicion of the dentist and oral surgeon alike, for the prognosis in Addison's disease is always grave.

BONE CYSTS

A solitary bone cyst of the mandible closely resembles cysts caused by hyperparathyroidism. Ruston *(22)* describing several such cysts, points out the diagnostic differences. Dental cysts caused by endocrinopathy have no epithelial lining and show no evidence of infection. Bone cysts sometimes expand by an increase in their fluid content, and the increased pressure from within a cyst causes resorption of the bone around it. This increase in the contents is explained by the unavoidable disturbance of the circulation in the immediate neighborhood of the primary cyst. According to Weinmann and Sicher *(23)*, a vicious circle is established; the cyst causes stasis and diffusion of the plasma or tissue fluids in the cavity, and its increased growth perpetuates its own circulatory disturbances.

CONCLUSIONS

Disorders of the glands of internal secretion produce certain oral, dental, and systemic changes. The dental officer must be alert to recognize these manifestations if he is to avoid certain pitfalls in dental treatment. Dental treatment in endocrine disorders is collateral and must be done in cooperation with a competent internist or endocrinologist.

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(22) Rushton, M. A.: Solitary bone cysts in mandible. Brit. Dent. J. 81: 37-49, July 19, 1946.

(23) Weinmann, J. P., and Sicher, H.: Bones and Bones. C. V. Mosby Co., St. Louis, Mo., 1947.

Deterioration of Silicate Cements in the Tropics[1]

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Irl C. Schoonover [2]

THE EFFECT of temperature and humidity on the setting time of silicate cements has been observed in dental offices and research laboratories for many years. Experience has shown that the use of a warm slab for mixing the cement and the increase in water content of the liquid caused by a high relative humidity produce a more rapid reaction between the powder and liquid and accelerate the setting process. Normally, therefore, in tropical areas where temperatures and humidities are high, silicate cements set too rapidly and make proper manipulation difficult or impossible. This difficulty can be and apparently is obviated in practice by using less than the usual amount of powder in order to obtain a workable consistency and overcome the rapid setting. This practice, however, results in a mixture of less than the standard powder-liquid ratio with its resultant loss of essential physical properties, such as a decrease in hardness and compressive strength, and an increase in staining, solubility, and shrinkage.

In World War II an entirely different problem was encountered by many dentists stationed in tropical areas throughout the world. Contrary to what was expected, the setting of silicate cements in the Tropics was seriously delayed and in some areas retarded to the extent that restorations from these materials had to be abandoned completely. At the time, the military services were at a loss to explain this peculiar phenomenon, and no scientific explanation or correction of this difficulty was available. Consequently large stocks of silicate cements that had been transported to these areas were discarded or disposed of, resulting in not only a huge monetary loss, but also a waste of critically needed shipping space.

Dental supplies sent to tropical areas during the war were exposed to excessively high temperatures (as high as 149° F.) in the holds of ships and during storage under canvas or in metal huts. The Ware-

[1] This investigation was conducted as a part of the cooperative research program between the National Bureau of Standards and the Army Dental Corps.
[2] Chief, Dental Research Section, National Bureau of Standards.

housing Division of the Army Quartermaster Corps and the Navy's Bureau of Ships reported that temperatures of 175° to 180° F. in the sun are recorded at certain places in the Tropics. Storage temperatures under canvas or in metal hutments registered around 145° to 160° F. Daytime temperatures approximated 130° F. in the shade and 110° to 125° F. in offices; nighttime temperatures ranged from 100° to 110° F. Thus it is reasonable to assume that dental supplies remained at a temperature of approximately 145° F. for at least a month while in transit, and for much longer periods of time in storage dumps or depots.

Evidence that deterioration occurred under these conditions was seen in the appearance of the packages received at dental installations in the Tropics. The boxes in which the powders and liquids were packed were stained, and a crystalline precipitate was often present around the neck of the bottles of liquid, indicating that an actual leakage had occurred. Often the liquid was discolored to a brown hue, making proper shade selection impossible. Plastic molded caps were frequently loose when received. Many bottles of silicate liquid were disposed of because of these failures alone. It was believed that the long exposure to high temperatures, caused by slow shipping in convoys, and improvised warehousing facilities, might account for the deterioration of silicate cements and explain why their behavior in wartime use was so different from that normally observed in tropical areas. To investigate this possibility the following experiments were conducted.

TABLE 1.—*Loss of weight (water) of liquid in original containers stored at 61° C. (142° F.)*

Cement	Percent loss in				
	24 hours	48 hours	72 hours	2 weeks	1 month
A	0.19	0.27	0.35	6.14	11.88
B	0.17	0.24	0.39	1.65	2.16
C	0.37	0.50	0.66	1.35	1.79
D	0.15	0.26	0.32	3.04	5.99
E	0.17	0.22	0.41	1.01	1.32
F	0.15	0.21	0.42	1.39	1.86
G	0.19	0.27	0.44	1.68	2.68

Several sealed bottles of each of the silicate cement liquids which appear on the American Dental Association List of Certified Dental Materials were carefully weighed and placed in an oven at 61° C. (142° F.), some in an upright and some in a horizontal position. The weights observed during this procedure are given in table 1. Other samples of the same cement liquids were stored in a constant temperature room maintained at 21° C. (70° F.) and 60 to 70 percent relative humidity. The effect of storage at the elevated temperature was noted by observing the conditions of the containers and weighing the bottles

at definite intervals of time. The data in table 1 show that in 24 hours the average loss in weight of the various samples ranged from 0.15 to 0.37 percent, depending on the brand of the cement liquid. As the time of storage at 61° C. increased, the average loss in weight showed a wider variation, ranging from 1.01 to 6.14 percent at the end of 2 weeks. During this time 2 of the samples of one brand of liquid were dropped from the study because of the leakage of most of the liquid caused by extrusion of the cork. After storage of the samples for 1 month at this temperature, the average weight loss varied from 1.32 to 11.88 percent. In addition to the loss in weight and volume, it was observed that caps were loosened, corks were extruded, a precipitate had formed around the necks of the bottles, and the liquid in several of the samples that were cork-sealed had discolored to varying shades of brown. No discoloration was seen in bottles sealed without the use of cork. All of the external appearances of the bottles of liquid that were observed in the Tropics were duplicated during the time these liquids were held at the simulated tropical temperatures in the laboratory.

At the end of the heating period mixtures were made from the oven-heated cements and from the cements stored under normal conditions. In each case the mixing technic and the powder-liquid ratio used were determined according to American Dental Association Specification No. 9 for dental silicate cement. The setting time of each cement investigated was determined. Again the same conditions observed in the Tropics prevailed; the setting time for any cement that had been heated was delayed. This increase in the setting time was directly related to the amount of weight loss observed for the sample.

It is apparent from these experiments that the retarded setting of silicate cements is associated with loss in weight of the liquid occurring during storage at elevated temperatures. Loss of liquid, however, does not explain the delayed setting, for if leakage alone occurred, the remaining liquid should react normally when mixed with the powder. If, however, the decrease in weight was caused by evaporation of water from the liquid, this loss would materially affect the physical properties of the cement.

To determine whether retarded setting was caused by evaporation of water from the liquid, the exact amount of weight loss of the liquid was calculated and this amount of distilled water was then added to the respective samples of liquid. Mixtures were again made and the setting times determined. The normal setting time established for each cement prior to heating was regained. These experiments indicate that the delayed setting of silicate cements in the Tropics was caused by loss of water from the liquid during storage and/or shipping at elevated temperatures. The excessive heat caused an expansion of the air and the liquid in the bottle, as well as an expansion of the plastic caps and a loosening of the cork seal sufficient to allow a loss of water by evaporation. Therefore, when these liquids were received by the dentist for use, enough water had been lost to seriously delay the setting time.

During this work it was observed that some cements were more susceptible and reacted more critically to a loss of water than others. To determine the variation in setting times of the different cements caused by either a loss or a gain in the water content of the liquid, a second series of experiments was made. New samples of all the cement liquids were exposed to elevated temperatures in open bottles and water was evaporated from them until water losses of 2, 5, 10, 15, and 20 percent by weight were attained. At the same time a sample of each liquid was carefully prepared with increments of 2, 5, 10, and 15 percent water by weight added to each bottle of liquid respectively. These prepared solutions were covered with a thin film of mineral oil to prevent a further gain or loss of water, as suggested by Paffenbarger et al. (3), and were stored at a constant temperature of 21° C. (70° F.).

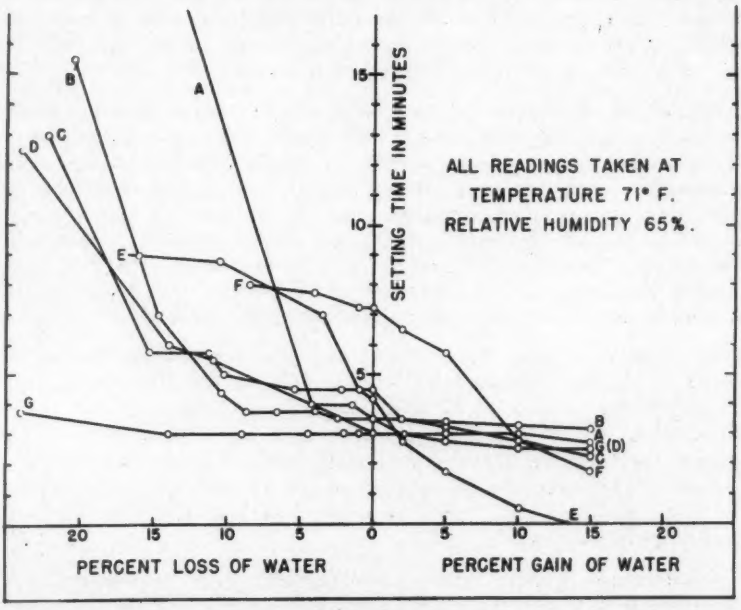

Figure 1.

Several mixtures of cement were made from each sample of prepared liquid, as well as from samples of untreated liquid, until an average setting time for each brand of cement was determined. The powder-liquid ratio for untreated cement was used. The results of these determinations are given in figure 1. These experiments were repeated on additional samples of the same cements used in the above experiments

(3) Paffenbarger, G. C.; Schoonover, I. C.; and Souder, W.: Dental silicate cements: physical and chemical properties and a specification, J. Am. Dent. A. 25: 32-87, Jan. 1938.

except that mixing was done under simulated tropical conditions of 33° C. (92° F.) and 90 percent relative humidity. The results are shown in figure 2.

It will be observed from the curves in figures 1 and 2 that a certain percent of water can be gained or lost by several brands of silicate cement without adversely effecting the setting time. Conversely, with some brands of cement a slight change in water content of the liquid seriously affects the setting time. It will also be observed that mixing of the cements at the elevated temperature and humidity decreased the setting time of all the cements and, in the case of the untreated liquids, to such an extent as to make most of them unusable. Although mixing under these conditions increased the speed of setting of some

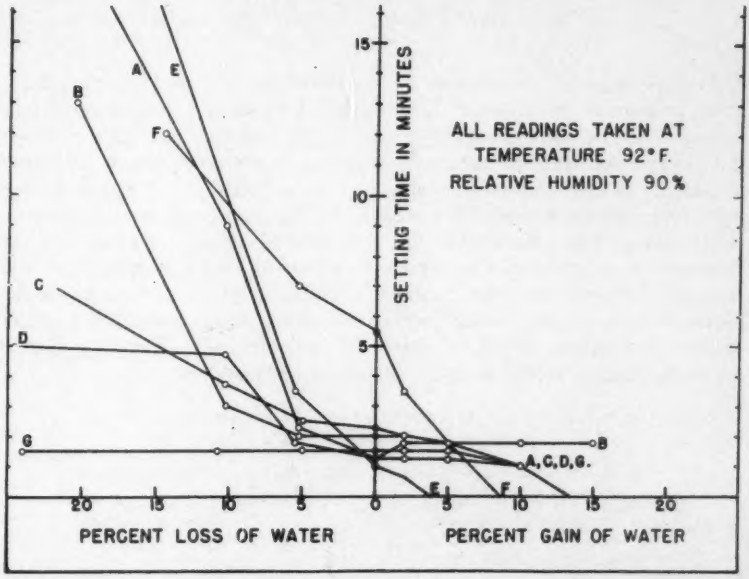

Figure 2.

of the cements sufficient to permit their use in dental practice, it will be shown in the following experiment that other essential properties were adversely affected.

Test specimens were prepared from the brands of cement most affected and least affected by water loss and water gain (E and G in figs. 1 and 2), using the powder-liquid ratio for untreated cement. Crushing strengths of these specimens were determined according to the method described in American Dental Association Specification No. 9 for dental silicate cement. The data given in table 2 show that there was an appreciable change in strength with a change in the water

content of the liquid. For all liquids having from 2 to 15 percent loss of water there was a reduction of strength. The strengths were slightly greater for the samples with 2 percent water added, but additional increases in water caused the strengths to decrease rapidly.

TABLE 2.—*Crushing strengths in pounds per square inch versus water loss and water gain*

Cement	Normal crushing strength	Percent water loss			Percent water gain		
		2	5	15	2	5	15
E	24,850	24,650	18,100	15,150	26,300	21,200	Too rapid a set
G	27,200	23,400	20,900	12,750	27,800	24,700	9,000

In the foregoing experiments it has been demonstrated that the physical properties of silicate cements are adversely affected by slight changes in the water content of the liquid, and that the loss of water by evaporation was the predominant factor in the deterioration of these materials in the Tropics. To eliminate these difficulties either a more efficient container must be designed or the facilities for transporting and storing dental materials must be improved so as to protect silicate cements from prolonged exposure to elevated temperatures. To avoid the difficulty encountered during the mixing of silicate cements in the Tropics a packaging device to insure a proper mixture under any atmospheric conditions would be ideal. The development of such a device is being studied at the National Bureau of Standards.

TABLE 3.—*Loss of weight (water) of liquid under oil film at a temperature of from 62° to 65° C.*

Cement	Percent loss in		
	1 week	2 weeks	1 month
Bottles capped:			
A	0.33	0.43	1.52
D	0.47	0.76	1.65
G	0.40	0.61	1.41
Bottles open:			
A	0.48	0.79	1.74
D	0.84	1.48	2.75
G	0.57	0.88	1.73

Until such a device is developed, however, a practical means of preserving the water balance of silicate liquid in the dental clinic wherever adverse atmospheric conditions exist is the method referred to above for maintaining the prepared samples for testing. Of the two methods suggested by Paffenbarger et al. the one using a film of light

mineral oil floated on the surface of the silicate liquid is the most adaptable to clinical use. The efficiency of this method of protection was tested, with the results shown in table 3. A few drops of light mineral oil were floated on the surface of the liquid. One group of bottles was exposed to temperatures of 62° C. (144° F.) with the caps removed, and the other group was exposed to the same temperature with the bottles tightly capped. It can be seen from the data in tables 1 and 3 that although oil on the surface of the liquid is not an adequate barrier to evaporation when the liquid is exposed to a temperature of 62° C. for a long time, it does retard the evaporation process.

A Locally-Fabricated Cervical Collar Used in Treatment of Simple Fractures of the Cervical Articular Processes

Warren E. Klein, *Captain, MC, U. S. N.* (1)

Robert H. Bradshaw, *Commander, MC, U. S. N.* (1)

THE NAVAL medical officer in the field or aboard ship occasionally desires to employ treatment aids which are not afforded by his stock room. In such instances, he may await procurement, abandon his plan, or improvise. The latter course allows more flexibility and an improvised mechanical aid may serve his need as well as a commercial product, though it may lack the cosmetic refinement.

In treating the patient here reported a cervical collar was needed to permit ambulation and to minimize the discomfort and psychic trauma incident to the cervical traction resulting from the use of a halter, pulley, and weight. Prolonged traction was not required as there was no displacement and no overriding. A cervical collar was designed by his medical officer and fabricated from salvaged material in an air squadron machine shop. It was completed and fitted to the patient within 24 hours after his admission to the hospital, replacing cervical traction and adding greatly to his comfort. This collar was used for 7 days until a commercial collar was procured.

CASE REPORT

On 2 August 1950 a 30-year-old naval aviator was piloting a jet aircraft at an altitude of 30,000 feet. On circling a cloud formation at a ground speed of 490 mph, he was confronted suddenly by a multiengine aircraft at a distance of about one-quarter mile. He immediately pulled up and banked right, finding himself in a high speed stall. After severe buffeting and an estimated two turns he recovered from the spin with a loss of 18,000 feet of altitude. Indicated g's were 7.5 front seat and

(1) U. S. Naval Air Station, Key West, Fla.

9.5 rear seat (which was unoccupied). The aircraft suffered extensive wrinkling of the metal tail surfaces, most marked on the right. The starboard wing light and the starboard gas tank cap were lost. A standard anti-buffet plastic helmet, weighing 2.5 pounds, was worn during the flight. After returning to the base the pilot experienced slight pain in the left side of his neck. This pain was thought to be caused by muscular strain and responded readily to heat treatment. Anteroposterior and lateral roentgenograms of the upper thoracic and cervical spines were taken. They revealed the vertebral bodies in normal position and the interspaces were well maintained. The films were interpreted as normal. All symptoms subsided within 2 days following the flight and the pilot resumed his regular duties.

On 9 August he occupied the rear seat of a jet aircraft and was subjected to about 3 g's during routine training maneuvers. Following this flight he noticed a mild recurrence of the pain in the left side of

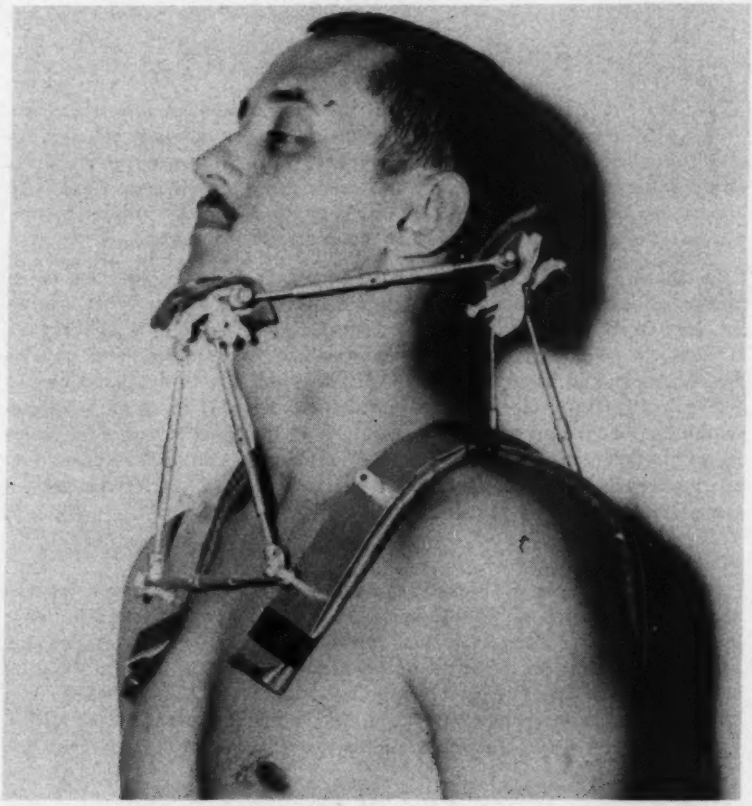

Figure 1.—Patient wearing locally-fabricated cervical collar.

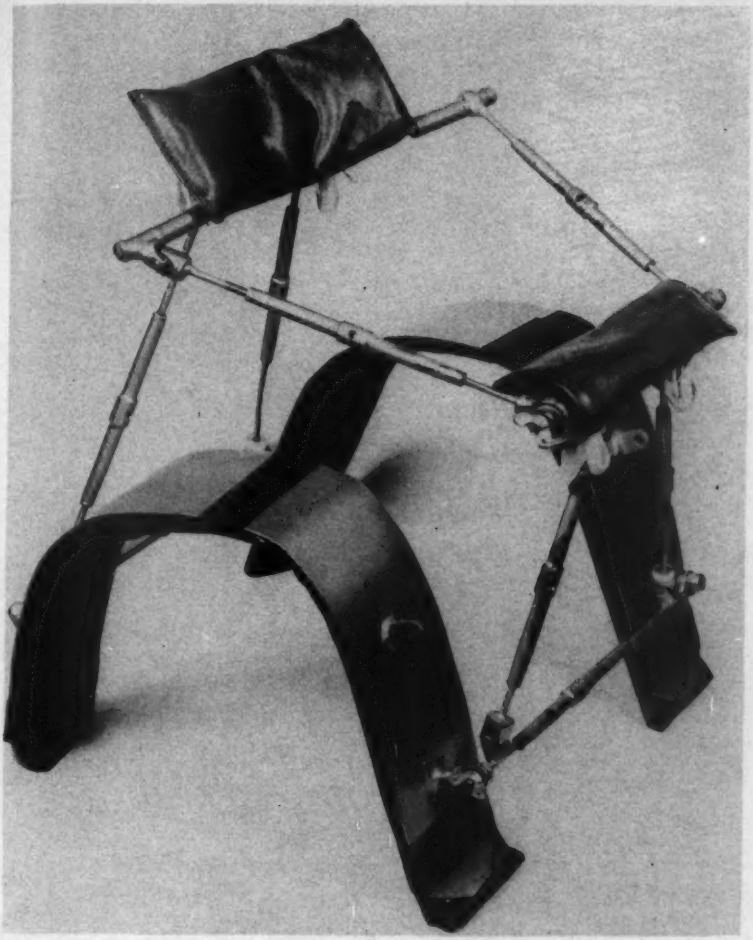

Figure 2.—Cervical collar fabricated in an air squadron machine shop.

the neck. Thinking this pain would disappear he made a second flight the same afternoon. He wore his standard anti-buffet helmet during each flight. The pain became severe following this flight and tenderness to pressure was noted over the insertion of the left trapezius muscle. On 10 August roentgenograms of the cervical spine, including oblique views, revealed a simple fracture of the left superior articular processes of the fifth and sixth cervical vertebras, without displacement and without overriding.

The pilot was admitted to the U. S. Naval Hospital, Key West, Fla., where cervical traction was applied, using a halter, pulley, and 5-pound weight. A locally-fabricated, adjustable, cervical collar (figs. 1, 2, and

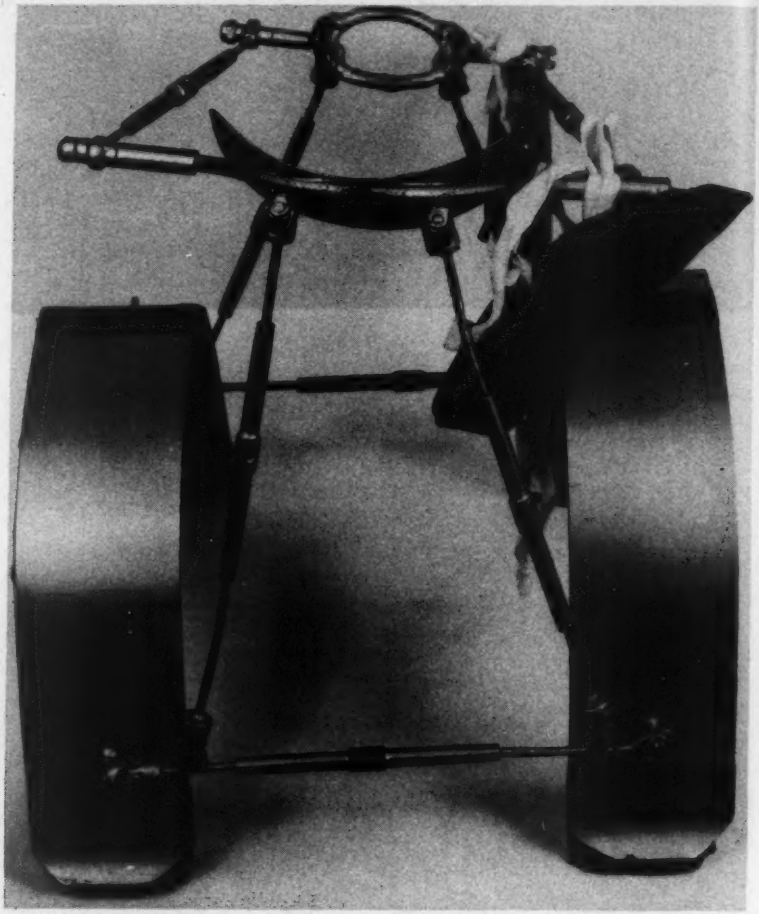

Figure 3.—Structural details of chin and occiput rests shown by partial removal of padding.

3) replaced the traction on 11 August. Reasonable comfort and full ambulation was accomplished. On 18 August a commercial cervical collar was procured and replaced the previous device. The chin rest of this collar was more comfortable than that of the one improvised. On 22 August the patient was allowed to stay at home while remaining on the sick list. Convalescence was uneventful and on 2 October he was returned to duty.

On 26 October pain in the left side of the neck recurred and was noted on 2 successive days. On 27 October reexamination of the cervical spine by x-ray revealed almost complete obliteration of the fracture

lines of the superior articular facets of the fifth and sixth vertebras on the left. This was interpreted as stable union. On 10 November it was recommended that this pilot be restricted to flying multiengine aircraft with safety pilot. The Bureau of Medicine and Surgery concurred in this recommendation.

DISCUSSION

It is anticipated that this pilot may return to unrestricted flying duties after an appropriate interval, free from recurrence of symptoms. Although he does not recall his helmet striking any part of the cockpit, or excessive motion of his head, it is apparent that unusual forces were sustained. The weight of the anti-buffet helmet, added to the weight of the pilot's head, may have contributed to the forces and consequent muscular effort in producing the trauma.

The collar constructed in a squadron machine shop, made no pretense to beauty, but proved to be functionally satisfactory. Its somewhat cumbersome appearance was caused by the use of 8 turnbuckles and 11 universal joints. These items, salvaged from completely disabled aircraft, allowed full adjustment and precluded failure to fit. The medical officer who devised the collar and the metalsmiths who constructed it were all inexperienced in this type of work and wished to insure a fit at the first trial. Two shoulder strips, each 2.5 by 18 inches, were formed of corrosion resistant steel sheet, 0.045 inch thick to fit the patient. Three steel studs and one eyebolt were silver-soldered to the steel strips for attachment of the turnbuckle spreaders, front and back. An oval chin rest was made by bending a ¼ inch steel rod and a small preventer was welded to either side of this rest to insure stability of the chin in the rest. An occipital rest was formed from sheet steel and silver-soldered to a formed steel rod occipital spreader. Turnbuckles were installed for chin-to-occiput adjustment, with 2 universal joints at the ends of the right turnbuckle. Four vertical turnbuckles, with universal joints at each end, were installed by silver-soldering to turnbuckle shafts of front and back chest spreaders and to chin and occiput rests. The turnbuckles permitted ready, easily-accomplished adjustment, both for original fit and for subsequent modification of position and tension.

Two studs were silver-soldered to the front of the shoulder strips, cephalad to the front spreader. These were intended for use in maintaining the shoulder strips in place by means of elastic bands. In practice, this tension was found to be unnecessary. Also, it was found on fitting that the entire structure was too flexible. The 2 upper, front and the 2 lower back universal joints were then silver-soldered into immobility, correcting this defect. Wing nuts were employed at the front of the right chin-to-occiput member, and at the junction of the front spreader with the right shoulder strip, permitting the collar to open, hinging on its universal joints to facilitate fitting and removal.

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Pads of orthopedic felt were covered with plastic upholstery material and secured in place, using electricians' tape for securing to the shoulder strips and ties of binding tape for securing to the chin rest and occipital rest. These pads were prepared in the parachute loft. The chin rest was made more comfortable by using a doughnut-shaped pad which distributes the pressure. As a final gesture, the metalsmiths who constructed the device applied a coat of quick-drying aluminum paint. These men were quite proud of their work and of the expedition with which it was fabricated, displaying marked interest in the progress of the patient, and visiting him to inquire as to the adequacy of the collar. The collar, no longer required by the patient, is now a part of the equipment of the crash ambulance, ready for emergency use in transporting any suspected injury to cervical vertebras.

Q Fever

Harvey H. Waldo, *Major, MC, U. S. A. (1)*

Q FEVER is an acute, specific, rickettsial disease of man. It is characterized by sudden onset, fever, malaise, headache, and a pneumonitis demonstrable on roentgenograms. It can easily be misdiagnosed as influenza or atypical pneumonia. Derrick *(2)* first reported 9 cases of this newly recognized clinical entity occurring in Queensland, Australia. He names it "Q" fever. Since then the disease has been found to be widespread. In this article two serologically proved cases of Q fever occurring in the same family are presented and the importance of considering the disease in the diagnosis, especially of what appears to be atypical pneumonia, is emphasized.

CASE REPORTS

Case 1.—A 38-year-old white, thin, nervous housewife was admitted to this hospital on 17 November 1948 complaining of occipital headache, stiff neck, chills, and fever which began about 48 hours previously. She was seen by a physician who made a diagnosis of "flu" and prescribed some tablets. On the following day, after a poor night's sleep, the symptoms were aggravated. Later in the day there was an episode of photophobia, diplopia, and blurred vision, lasting about 1 hour. This was followed by the appearance of an occipital headache and a stiff neck. The temperature, taken by her husband, was elevated. During the day prior to admission the symptoms were intensified. The patient was seen that evening by a medical officer from the outpatient department, and hospitalization was advised. Previous personal history was not significant except that 6 months earlier the patient had been in bed for 3 months because of pain in the right ankle. She had received sulfonamides and was told that she had rheumatic fever.

Physical examination on admission revealed some nuchal rigidity and a positive Kernig's sign bilaterally. The temperature was 103° F.; the pulse was 96; respirations were 20; and the blood pressure was 105/75. Except for slight dehydration, the remainder of the physical examination was essentially negative. A lumbar puncture revealed

(1) Walter Reed Army Hospital, Washington, D. C.

(2) Derrick, E. H.: "Q" fever, new fever entity: clinical features, diagnosis and laboratory investigation. M. J. Australia 2: 281-299, Aug. 21, 1937.

normal dynamics and fluid. Urinalysis was negative. Blood smears were negative for malarial parasites. There were 9,700 white blood cells, with 80 percent neutrophils, 19 percent lymphocytes, and 1 percent eosinophils. The initial impression of the medical officer of the day was that the patient had objective evidence of meningeal irritation, but the cerebrospinal fluid was clear and that a virus involvement, such as lymphocytic choriomeningitis, should be considered.

During that day and the next the patient's temperature ranged between 101° and 106° F. (fig. 1). Serial blood cultures taken on admission showed no growth. A pelvic examination was made with difficulty

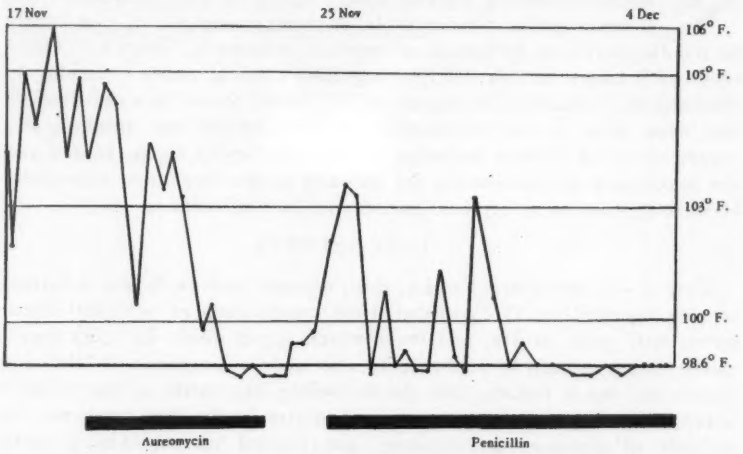

Figure 1.—Case 1. Temperature chart showing response to aureomycin therapy. (Recurrence of fever may have been caused by secondary infection.)

because of exquisite tenderness. The uterus seemed slightly enlarged, and a mass 4 by 2 cm. was felt in the rectum. Proctoscopy revealed no mucosal abnormality or mass. Stool cultures, typhoid, paratyphoid, and dysentery agglutinations were negative. The sedimentation rate was 21 (Wintrobe).

The day following admission a roentgenogram of the chest revealed an area of mottled infiltration in the upper lobe of the right lung. This had the appearance of an acute inflammatory process, but neoplastic disease was listed as a possibility (fig. 2). On this day it was discovered that a basement room of the patient's house was rented by a research physician who worked in the Q fever laboratories of the National Institutes of Health, Bethesda, Md. The patient cleaned his room, laundered his towels and bedding, and had occasional social contact when the roomer visited the couple upstairs in the evening. A presumptive diagnosis of Q fever was made and aureomycin therapy was started. One gram was given initially and 0.5 gram was given every

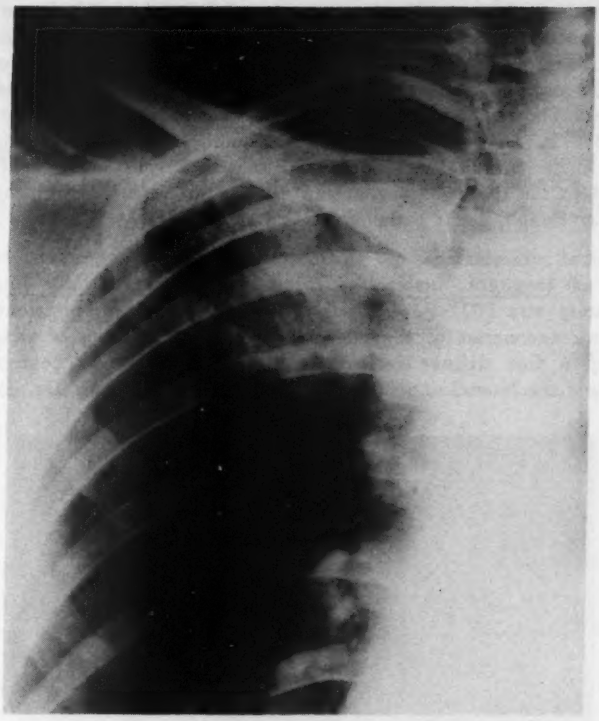

Figure 2.—Case 1. Roentgenogram of chest taken on admission.

4 hours thereafter. The temperature fell to normal by lysis within 2 days. This was accompanied by definite relief of symptoms. The available supply of aureomycin was exhausted in 4 days. Three days thereafter the temperature again began to rise. This was accompanied by a leukocyte count of 14,500. The patient was then given 50,000 units of penicillin every 3 hours and the temperature returned to normal but spiking occurred occasionally during the following week. The symptoms were relieved, but marked weakness and increased nervousness persisted for about 2 months.

An initial complement-fixation titer for Q fever determined on 26 November, the eleventh hospital day, was 1:160. Two weeks later the titer had increased to at least 1:640 (no end point was reached). Ten months after the illness the titer was 1:80. A specimen of blood taken 2 years after the illness showed a decrease in titer to 1:20. Tests for cold agglutinins and psittacosis and lymphogranuloma venereum on 26 November were negative. The titer with OX19 and OX2 on the same day were both 1:40.

Case 2.—A 44-year-old white man was admitted to this hospital on 16 December 1948, the day following the discharge of his wife (Case 1). He had felt well until the evening before admission when he experienced the sudden onset of malaise, dizziness, and frontal and occipital headache. The headache was relieved by salicylates, His temperature was 101° F. During the night the headache recurred, keeping him awake. In the morning he felt so weak that he "could hardly walk." He reported to the dispensary and was advised to report to the hospital. He had no cough, chest pain, or nasal discharge.

Physical examination on admission was negative except for the finding of crepitant, inspiratory rales in the right axillary line. His temperature was 102° F.; his pulse was 80; and his respirations were 20. A roentgenogram of the chest taken on the morning of admission revealed a fine diffuse infiltration involving the right costophrenic region and the lateral aspect of the base of the right lung (fig. 3). This

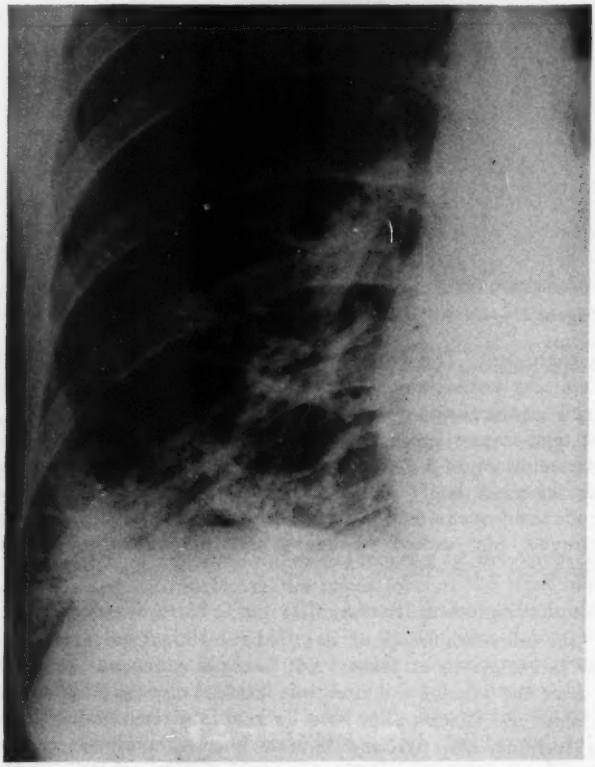

Figure 3.—Case 2. Roentgenogram of chest taken on admission.

was interpreted by the radiologist as pneumonia, type undetermined. The leukocyte count was 10,750 with 69 percent neutrophils, 23 percent lymphocytes, 4 percent monocytes, and 4 percent eosinophils. Urinalysis was negative. The sedimentation rate was 30 (Wintrobe).

Headache remained the patient's principal complaint, but most of the time he refused any medication for relief. Within 48 hours he felt much better, but still complained of weakness and headache. He was afebrile within 72 hours without any form of specific therapy (fig. 4).

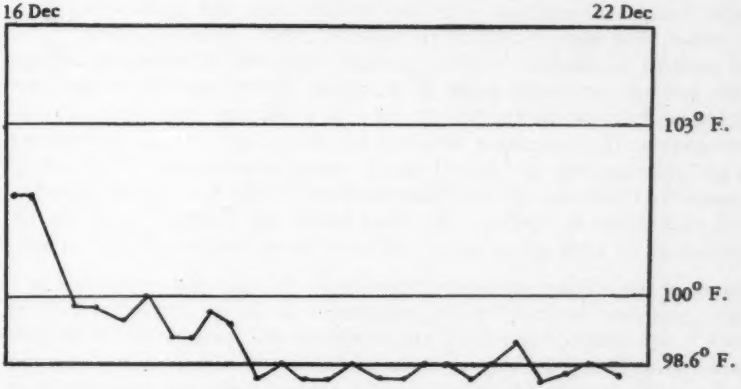

Figure 4.—Case 2. Temperature chart showing mild course of the disease.

Cough or chest pain were never significant. Some headache and weakness persisted for 3 weeks. Because Q fever was immediately suspected, serologic tests were made early. The complement-fixation titer for Q fever was 1:10 on the second and twelfth hospital day, but on the fifteenth day it was 1:40, and on the nineteenth day it was 1:160. After 9 months the titer was 1:40, and after 2 years it had returned to 1:10.

COMMENT

Q fever in these two patients has shown a variance in its severity. The patient treated with aureomycin seemed to respond well to this drug. The second patient required no specific therapy for prompt recovery. The apparent exacerbation of the disease in the first patient 3 days after the discontinuance of aureomycin may have represented a secondary infection, as indicated by the leukocytosis and the response to penicillin. In both patients a diagnosis of influenza could well have been made in the absence of x-ray facilities. With films showing pulmonary infiltration, a diagnosis of atypical pneumonia would have been logical. One patient was initially diagnosed "flu," and later was suspected of having meningitis. Serologic studies established the definitive diagnosis in these two cases. It is to be emphasized that it is

good practice when the diagnosis is in doubt to take a blood specimen which may be kept refrigerated. This specimen may never be used, but if later serologic studies are made, this initial specimen will be available for comparison.

SUMMARY

Q fever is a rickettsial disease which may easily be overlooked or misdiagnosed. It is to be suspected in each case characterized by sudden onset of malaise, fever, headache, and pulmonary infiltration. A definitive diagnosis can be made only by serologic studies.

Dental Centroscope

Francis W. Shaffer, *Major, DC, U. S. A.* (1)

THE establishment of the centric relation, once the vertical dimension has been determined, is a problem that faces most prosthodontists. This problem is difficult especially when a marked protrusion or retrusion is present. Some routines of fixation of the centric relation are by means of (1) lines drawn on the wax rims and the rims luted together with wax; (2) the use of paper clips which are pressed in the rims across the occlusal plane; and (3) notches cut on the top of the occlusal plane of one rim and on the opposing rim a softening of the wax which is compressed into the notches on closure. As all these methods are being used, the problem of rechecking the centric relation in the mouth creates a margin for error in judgment.

A small template (fig. 1) with sliding triangular guides was devised in this laboratory to aid in overcoming some of these problems. For lack of a better name, the template was called a "centroscope." The centroscope is versatile and can be made to conform to all normal and most abnormal jaw relationships without losing the centric relation for articulating purposes, once the bite rims have been removed from the mouth.

The centroscope is luted with wax to the upper bite rim after the vertical dimension has been established (fig. 1). By means of the lock-nut in the middle of the centroscope the two posterior triangular guides can be moved in or out, backwards or forward to conform to the ridge shape and locked there once the correct position has been determined. The occlusal surface of the lower rim is warmed slightly with a Hanau torch and a tentative closure is made into the lower rim to see if the triangular guides are in the position required by the operator. If not, the guides can be adjusted to contact the lower rim in the proper areas (bicuspid-molar area). The triangular guide on the front of the centroscope is fixed permanently and needs no adjustment.

When the two posterior guides are adjusted, the indentations left by the guides on the rims by the tentative closure are softened at least 4 mm. and the patient is instructed to close in centric relation. The various technics for accomplishing this closure are left to the discretion of the operator. After the wax has cooled enough so that the lower bite

(1) Fifth Army Central Dental Laboratory, St. Louis Medical Depot, St. Louis, Mo.

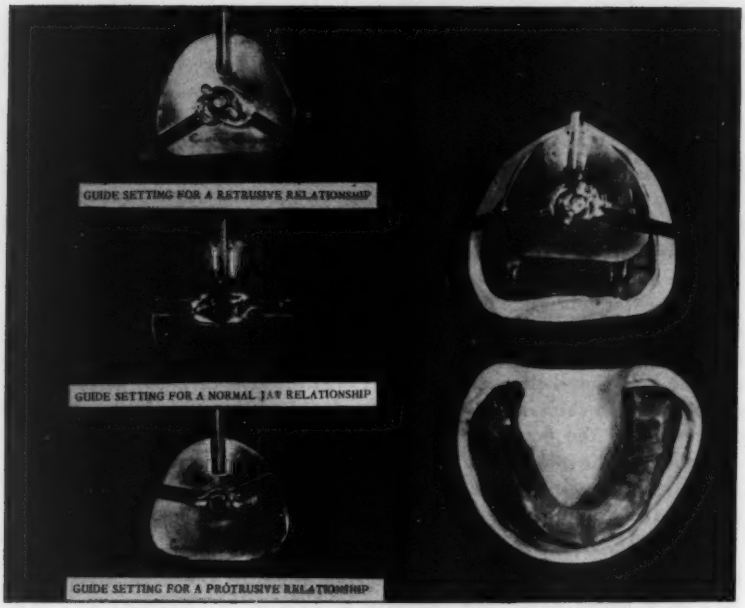
GUIDE SETTING FOR A RETRUSIVE RELATIONSHIP
GUIDE SETTING FOR A NORMAL JAW RELATIONSHIP
GUIDE SETTING FOR A PROTRUSIVE RELATIONSHIP

Figure 1.

rim can be removed, it is removed and checked carefully to see if clean, sharp indentations have been made. If any doubt exists as to whether or not the centric relation is correct the lower rim is chilled thoroughly and inserted in the mouth. The patient then is reinstructed to close into centric occlusion several times and if this is correct, he will close innumerable times in the indentations previously made.

Once the centric occlusion has been found to be correct the models can be placed on an articulator by means of this centric relation as determined by the centroscope. It is advisable to lute the rims together before mounting the models. One can go further with this centric relation by making two new sets of bite rims out of quick-cure acrylic on the articulated models and mounting a check-bite appliance. With the check bites that are obtained all the condylar inclinations necessary for further perfection of balanced occlusion can be determined. All full dentures should have balanced occlusion in all ranges of excursive movement and can only be obtained with a good initial centric and a scientific technic of determining all condylar elements of movement.

Primary Pigmentary Degeneration of the Retina

Report of Five Cases

Norman Yourish, *Captain, MC, U. S. A.* (1)

PRIMARY pigmentary degeneration of the retina, or retinitis pigmentosa, is a not uncommon disease in the military age group. The diagnosis can be suspected from the history and easily confirmed by examination of the eyegrounds. The prognosis and unfavorable course are not sufficiently appreciated. The purpose of this article is to review the pathology, diagnosis, and prognosis in this disease. We have recently seen four patients with this disease and one with the much rarer related condition, retinitis punctata albescens at this hospital.

CASE REPORTS

Case 1.—This 22-year-old man had complained of night blindness for 10 years. Consanguinity, a common finding in the family history of these patients, was present as his parents were cousins. Although the patient had a physician's note stating that his brother and he had been examined and found to have "incipient retinitis pigmentosa," he was inducted by his local board. Examination in the eye clinic revealed vision: O. D. 20/40 (corrected), O. S. 20/30 (corrected). No abnormalities were seen externally or with the slit lamp. The optic disks and vessels were normal but the periphery of the retina showed scattered irregular deposits, typical of pigmentary degeneration of the retina. The superior, inferior, and nasal fields were limited to 20° bilaterally. The right and left temporal field was nearly normal in extent but each contained a scotoma.

Case 2.—This 23-year-old man had served in the Army previously and been discharged to the Enlisted Reserve Corps. He had suffered from poor night vision for many years and more recently had noted difficulty seeing even in daylight. His mother was virtually blind from

(1) U. S. Army Hospital, Fort Dix, N. J.

retinitis pigmentosa and his brothers and sisters were said to have some degree of visual disability. His vision was O. D. 20/25 (corrected) and O. S. 20/25 (corrected). He had a mild bilateral blepharitis. Slit lamp examination was negative. Retinoscopy revealed a marked vitreous haze bilaterally, attenuation of all the large vessels, especially the arteries, and advanced pigmentary changes throughout the fundi of both eyes. There was concentric contraction of the visual fields to 15° in all quadrants bilaterally.

Case 3.—This 20-year-old man had had poor night vision and failing central vision for many years. He had served in the Army for 19 months and had been given pills, possibly vitamin A, and glasses but no improvement of vision was noted. He believes his parents are "distantly" related. Examination in the eye clinic revealed vision: O. D. 20/50 (corrected), O. S. 20/60 (corrected). No abnormalities were seen externally or with the slit lamp. There was a vitreous haze, bilaterally. The

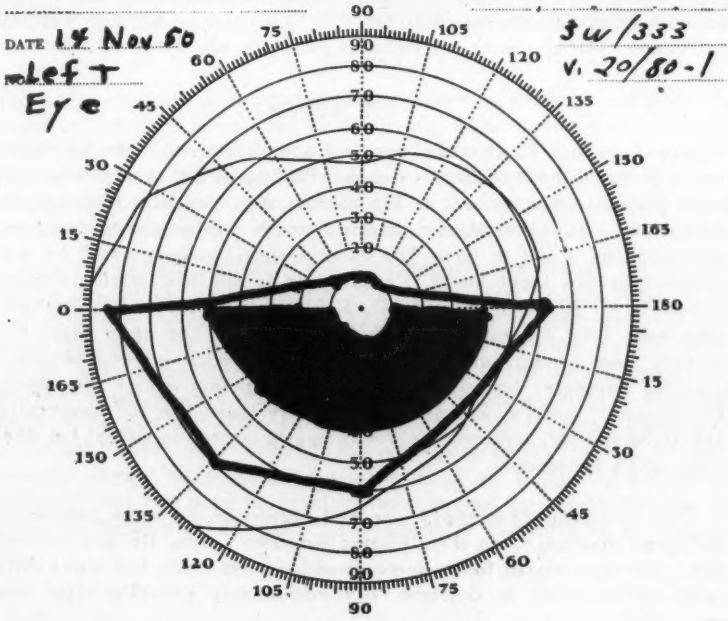

Figure 1.—Case 3. Visual field of left eye.

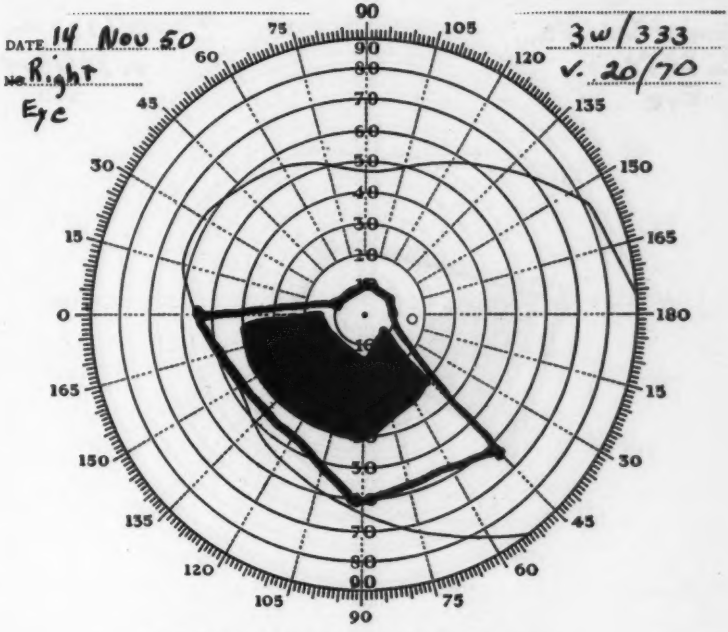

Figure 2.—Case 3. Visual field of right eye.

optic disks showed an early waxy atrophy, bilaterally. Marked attenuation of all the vessels and many large irregular deposits of pigment were seen. There was complete loss of the superior visual fields bilaterally. The inferior fields were slightly contracted and showed large "ring" scotomas (figs. 1 and 2).

Case 4.—This 23-year-old man had noted night blindness for as long as he could remember. He had been to physicians and received glasses, which did not help him and which were discarded. He received similar treatment in the Army. He had six siblings two of whom also had night blindness. His vision was O. D. 20/30-1 (pin-hole) and O. S. 20/30 (pin-hole). Early, bilateral posterior cortical cataracts were seen with the slit lamp. The optic disks showed early, waxy atrophy bilaterally. Sclerosis of the retinal vessels was moderately advanced. Peripheral retinal areas were covered with typical irregular deposits of black pigment. The visual fields were reduced to 20° in all quadrants except

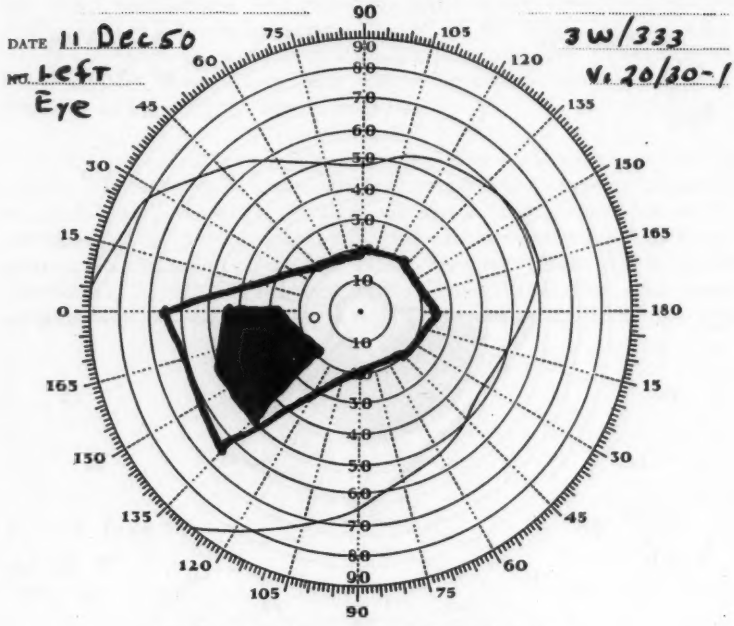

Figure 3.—Case 4. Visual field of left eye.

for sparing of the temporal field which extended to 60°, and contained a ring scotoma (figs. 3 and 4).

Comment.—All but one of these four patients showed relatively good central vision, although they had surprisingly large field defects. The field defects, visual loss, and fundus changes were remarkably symmetrical in both eyes. All the patients had been treated by glasses, and one by medication without a funduscopic or visual field examination. Consanguinity of parents was suggested in two of the family histories and three had siblings who were affected.

Case 5.—This 21-year-old man had a rare form of primary degeneration of the retina, known as retinitis punctata albescens. His only complaint was night blindness since early childhood. His eyegrounds showed innumerable small white round dots in the retina. These were widely scattered through the fundus on a plane deeper than the vessels.

Night blindness is present in these patients from an early age but the visual deterioration is stationary, or very slowly progressive. Some

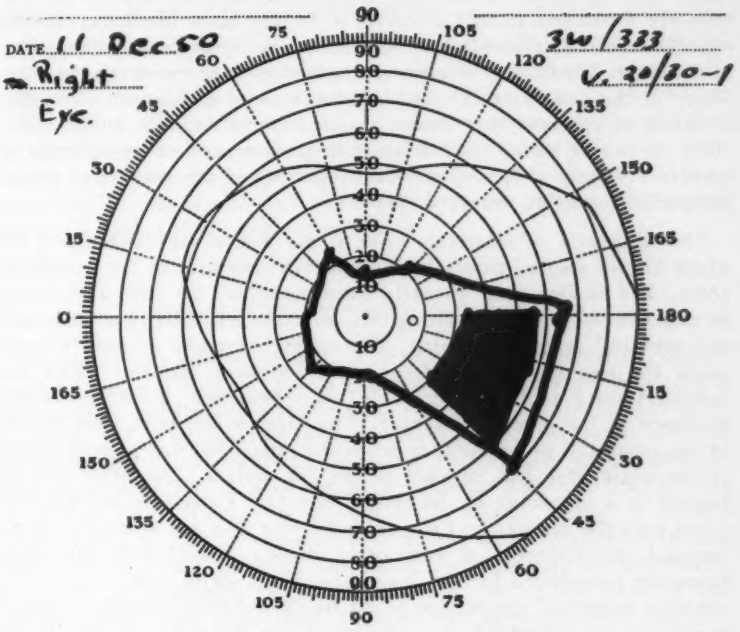

Figure 4.—Case 4. Visual field of right eye.

later develop retinitis pigmentosa as well (2). Visual acuity and fields in this patient were normal. I had an opportunity to examine his brother, a member of the Naval Reserve, and he had identical findings.

DISCUSSION

Primary pigmentary degeneration of the retina is a hereditary disease, which is characterized pathologically by degeneration of the retinal neuro-epithelium. The signs and symptoms usually do not appear until the second decade, despite its heredofamilial background. Clinically, the progression of symptoms is as follows: (1) night blindness, (2) progressive loss of peripheral fields of vision, (3) loss of central acuity, and (4) eventual blindness. The first visual elements to degenerate are the rod cells of the peripheral retina. The pigment epithelium then deteriorates releasing pigment which migrates into the retinal tissue and is deposited in spidery clumps along the retinal vessels. Later vascular sclerosis occurs in the retinal arteries and veins (2) (3).

(2) Duke-Elder, W. S.: Textbook of Ophthalmology. Vol. 3. The C. V. Mosby Co., St. Louis, Mo., 1940. pp. 2765-2786.

(3) Elwyn, H.: Diseases of the Retina. The Blakiston Co., Philadelphia, Pa., 1946. pp. 250-280.

The chief function of the rods is in night vision. Normal night vision and adaptation (scotopic vision) imply that there is normal function of the peripheral retina. Because the peripheral retina is impaired and the rods are destroyed in this disease, a severe night blindness ensues which cannot be influenced by vitamin A, or by prolonged adaptation in dim light. The history is often strongly suggestive in these patients. There is the complaint of night blindness since childhood. They may complain of progressively poorer vision even in daylight and of difficulty in moving about without stumbling. There are often siblings or parents similarly afflicted, and consanguinity of the parents or grandparents is commonly observed *(2) (4)*.

The diagnosis is relatively easy if the pupils are dilated and the whole fundus studied carefully, with special attention to the peripheral areas. The findings are virtually pathognomonic. No difficulty should be experienced in differentiating this from disseminated chorioretinitis, or congenital pigment grouping. The ophthalmoscopic picture is dominated by irregular spidery deposits of jet-black pigment, which has been described as "bone corpuscle" in appearance, occurring without evidence of inflammatory disease. The pigment deposits first appear in the equatorial or midzonal areas of the retina and then spread inward to the optic disk and outward to the ora serrata. The other striking feature is a narrowing of the retinal vessels, especially the arteries. Later both the arteries and the veins become thin and sclerotic. In the terminal phase there is a waxy optic atrophy. Visual field determinations are not needed for the diagnosis. They are of interest, however, showing peripheral contraction of the fields and ring scotomas. Usually the fields are remarkably symmetrical in the two eyes, as are the degenerative changes *(5)*.

Although this is considered a hereditary disease it is rare for changes to be evident in the fundus before the age of 6 years. More usually, they begin in the early teens. These changes progress slowly and should be clearly visible in most cases by the end of the second decade. The most widely credited etiologic theory is that the degeneration is an abiotrophic process, i. e., an inherited tendency to premature senility and death of the cells of the neuro-epithelium *(2)*.

The prognosis is poor, as no satisfactory treatment has yet been devised. This is attested by numerous and sometimes heroic measures that have been attempted, including such ocular operations as trephining, paracentesis, and cyclodialysis *(3)*. Vasodilators, retrobulbar injection, and cervical sympathectomy have been used to treat the vascular sclerosis *(6)*. Pituitary, ovarian, and testicular hormones have been

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(4) Tassman, I. S.: The Eye Manifestations of External Diseases. 2d edition. The C. V. Mosby Co., St. Louis, Mo., 1946. pp. 231-233.

(5) Traquair, H. M.: Clinical Perimetry. The C. V. Mosby Co., St. Louis, Mo., 1948. pp. 97-99.

(6) Walsh, F. B., and Sloan, L. L.: Results of cervical sympathectomy in pigmentary degeneration of retina. Arch. Ophth. 14: 699-714, Nov. 1935.

tried with no consistent success. ACTH was tried by Gordon and McLean (7) in one patient with slight temporary improvement.

CONCLUSIONS

This disease is important in military ophthalmology and should be more widely understood because: (1) disability becomes increasingly severe in the military age group; (2) night vision is the earliest function to be severely affected; (3) constriction of the peripheral visual fields appears and progresses steadily and relentlessly in both eyes; and (4) no treatment known today is of value. These patients should therefore be diagnosed and separated from the service before they become a danger to themselves or others.

ADDITIONAL COMMENT

Austin Lowrey, *Colonel, MC, U. S. A. (8)*

The cause of retinitis pigmentosa is unknown. It is inherited, becoming apparent, not at birth, but in childhood, and frequently resulting in blindness in middle life and old age. The ratio of male to female patients is 3:2. The disease may occasionally be associated with the Laurence-Moon-Biedl syndrome (obesity, polydactyly, hypogenitalism, and mental retardation). It is invariably bilateral although one eye may be involved several years in advance of the other. Although it is characteristically a slowly progressive disease, acute aggravations may occur following loss of blood, malaria, acute xanthoma, and pregnancy. It is always associated with attenuation of the retinal vessels and nearly always with pigmentary changes in the retina. The cardinal symptoms are night blindness and progressive limitation of the visual fields. The pathologic changes consist of a progressive degeneration of the neuro-epithelium, primarily of the rods.

As to the treatment, nowhere in medicine does one see the enthusiasm of the doctors with the credulity or desperate hopefulness of the patients combined to produce so many worthless cures. Some of the treatments recommended are:

1. Vasodilatation by (a) sectioning of the sympathetic nerve, (b) subconjunctival injections of hypertonic saline solution, (c) amyl nitrate, (d) nitroglycerin, (e) miotics, (f) mydriatics, (g) vitamins, (h) acetylcholine, or (i) repeated paracentesis and cyclodialysis.

2. Hormonal treatment with liver, pituitary, or adrenal extract.

3. Various vitamins, especially A and D.

4. Galvanism.

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(7) Gordon, D. M., and McLean, J. M.: Effects of pituitary adrenocorticotropic (ACTH) therapy in ophthalmologic conditions. J. A. M. A. 142: 1271-1278, Apr. 22, 1950.

(8) Walter Reed Army Hospital, Washington, D. C.

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5. X-ray.

6. Implantation of placental tissue subconjunctivally.

Patients with retinal pigmentosa should not be inducted in the services because it is a waste of government funds. Frequently these patients are trained and promoted into responsible positions, many of which require acute night vision and it is only then that their condition is discovered. Most of these patients could be screened out at the induction centers on the basis of history and funduscopic examination. Such an examination should not ordinarily take more than 30 seconds. The incidence is not high enough to warrant the taking of night vision, dark adaptation, fields of vision, et cetera, at induction centers.

Hexamethonium (C6) in the Management of Causalgia

John C. Rose, *First Lieutenant, MC, A. U. S.* (1)

Jay N. Wemple, *First Lieutenant, MC, A. U. S.* (1)

THE availability of new drugs renews the possibility of the medical management of causalgia, or at least its alleviation prior to surgical treatment. As an adjunct to a study conducted by Freis and coworkers (2), a new drug (3), hexamethonium (C6) (manufactured as hexamethonium bromide or hexamethonium iodide), has received a preliminary clinical trial in the treatment of causalgia complicating peripheral nerve injuries occurring in 10 battle casualties.

Hexamethonium is a recently introduced hexane derivative of polymethylene bistrimethyl ammonium, which preliminary data has indicated to be a potent autonomic ganglion blocking agent (4) (5). Using skin temperature responses as a basis for comparison, Finnerty and Freis (6) have shown that the vasomotor effect of C6 given intravenously is greater and more prolonged than that of either priscoline, or tetraethylammonium intravenously. Severe postural hypotension (lowering of blood pressure while erect but not while recumbent) has been the only significant side effect noted by these investigators.

(1) Neurosurgical Section, Walter Reed Army Hospital, Washington, D. C.

(2) Freis, E. D.; Schnaper, H. W.; Johnson, R. L.; Rose, J. C.; and Finnerty, F. A., Jr.: Clinical evaluation of hexamethonium, a new ganglionic blocking agent; preliminary report. Presented at the Southern Society for Clinical Research, New Orleans, La., 27 January 1951.

(3) In limited distribution and not yet released for general use at the time this article went to press.

(4) Paton, W. D. M., and Zaimis, E. J.: Clinical potentialities of certain bisquaternary salts causing neuromuscular and ganglionic block. Nature, London 162: 810, Nov. 20, 1948.

(5) Burt, C. C., and Graham, A. J. P.: Pentamethonium and hexamethonium iodide in investigation of peripheral vascular disease and hypertension. Brit. M. J. 1: 455-460, Feb. 25, 1950.

(6) Finnerty, F. A., Jr., and Freis, E. D.: Experimental and clinical evaluation in man of hexamethonium (C6), a new ganglionic blocking agent. Circulation 2: 828-836, Dec. 1950.

The patients on whom this study was made were recent casualties from Korea with penetrating wounds of the extremities. An upper extremity was involved in 6 patients and a lower extremity in 4. In each patient, at least one major nerve trunk was injured, as tabulated in table 1. At the onset of this study, all 10 patients had severe causalgia. The pathogenesis of this syndrome and the criteria for its diagnosis have been reviewed in several recent publications (7) (8) (9).

The onset of causalgia varied from almost immediately following injury to 4 weeks after injury. The common factor to all was severe burning pain in the hand or foot. Other aspects of this syndrome —trophic and temperature changes, and emotional factors—varied and ranged from none to those displayed by a patient showing apprehension and protecting a swollen, profusely sweating, warm, glossy, dusky, and markedly hyperesthetic hand or foot.

Hexamethonium bromide was administered both intravenously and intramuscularly to all these patients except 2 of whom one received the drug only intravenously and the other received it only intramuscularly. The usual dose was 50 mg.; slight but probably insignificant increases in this dose were occasionally used. Placebos (sterile water) were also administered to these same patients and in the same manner as was the drug during the course of treatment. All 10 patients were normotensive and their ages ranged from 18 to 23 years. The drug was routinely given with the patient flat in bed without a pillow. This position was maintained for a period of at least 90 minutes, and blood pressures were taken periodically following each injection. The effects on the blood pressure varied from none to a maximum of a 30 mm. drop in both systolic and diastolic readings. There was symptomatic postural hypotension in one instance (Case 3). The drug was discontinued in Case 9 because of nausea. No other patient became nauseated because of the drug, and none vomited.

Three of the patients in this study received one or more intra-arterial injections of 50 mg. of priscoline in the affected extremity. It had been the previous experience of this neurosurgical section that priscoline given orally and intravenously was without significant effect in causalgia, and that intra-arterial injection of the above dose, in most cases, resulted in immediate and complete relief of pain for from one-half to two and one-half hours. Arterial injection is occasionally difficult. In wounded extremities it is often impractical.

Seven of these patients subsequently required sympathectomies for permanent relief of pain. The dorsal sympathectomies performed were

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(7) Livingston, W. K.: Pain Mechanisms. The Macmillan Company, New York, N. Y., 1944.

(8) Shumacker, H. B., Jr.: Causalgia; general discussion. Surgery 24: 485-504, Sept. 1948.

(9) Echlin, F.; Owens, F. M., Jr.; and Wells, W. L.: Observations on "major" and "minor" causalgia. Arch. Neurol. & Psychiat. 62: 183-203, Aug. 1949.

TABLE 1.—*Average relief of pain obtained from therapy*

Case	Age (years)	Nerve injured	Location	Relief with				
				Placebo	Priscoline intra-arterially	C6 intravenously	C6 intramuscularly	Sympathectomy
1	18	Common peroneal	Knee	None	*	Complete for 2 hr.	Complete for 6 hr.	Complete; no recurrence
2	21	Ulnar and median	Arm	Slight for ½ hr.	Complete for 1½ hr.	Complete for 1½ hr.	Complete for ½ hr.	Complete; no recurrence
3	23	Ulnar and median	Forearm		Complete for ½ hr.		None	Complete; no recurrence
4	20	Brachial plexus				Partial from 5 to 24 hr.		Complete; no recurrence
5	19	Sciatic	Thigh	None	Complete for 24 hr.; partial for from 1 to 6 days	Complete for 30 hr.; partial for 7 days; recurrence milder.		
6	18	Brachial plexus		None		Complete for 2½ hr.	None	Complete; no recurrence
7	18	Sciatic	Thigh	None		Complete for 2 hr.	Complete for from 2 to 2½ hr. with recurrence milder.	
8	20	Radial, median and ulnar	Arm	None		Complete for 3 hr.; partial for 3 more hr.	Complete for 3 hr.; partial for 3 more hr.	Complete; no recurrence
9	19	Sciatic	Thigh	None		Complete for 2 hr.	Partial for 1 hr.	
10	23	Ulnar and median	Arm	Partial for ½ hr.		Complete for 3 hr.	Complete for 3 hr.	Partial; no recurrence

* Complete relief for 40 minutes with 300 mg. of tetraethylammonium chloride given intravenously.

preganglionic in type, with section of the rami communicantes of the second and third dorsal sympathetic ganglia and the sympathetic chain between the third and fourth dorsal sympathetic ganglia. The second and third intercostal nerves including the dorsal root ganglia were avulsed from the neural canal. In lesions of the lower extremity, the second and third lumbar sympathetic ganglia with the intervening chain were excised. The operation on Case 10 resulted in an incompletely sympathectomized upper extremity. In this case, the rami of the third and fourth sympathetic ganglia had been sectioned, as indicated by postoperative roentgenograms which revealed resection of the fourth instead of the third rib.

The following are five representative cases in this series, abstracted to recount the course of their therapy. Average responses to drugs and surgery are summarized in table 1.

CASE REPORTS

Case 1.—An 18-year-old soldier was wounded in the left knee and popliteal space on 7 September 1950, incurring damage to the common peroneal nerve. Three weeks following injury he began to have severe burning and stinging pain over the lower third of the leg and dorsum of the foot with minimal trophic changes. Repeated intravenous doses of 50 mg. of C6 resulted in immediate freedom from pain lasting 2 hours. Placebos gave no relief. On 5 October, he began a 4-day course of 50 mg. of C6 intramuscularly every 6 hours. Complete relief lasted 4 hours with the first two injections and until the next dose for the remainder of the 4 days. Identical causalgic pain recurred on 13 October. He was given 300 mg. of tetraethylammonium chloride intravenously which relieved the pain completely for 40 minutes. Narcotics were then required. He then began a 5-day regimen of C6 intramuscularly and for 5 days remained completely free of pain. Pain of the same intensity recurred within 12 hours of cessation of the drug. A left lumbar sympathectomy was performed on 1 November and has resulted in complete freedom from pain.

Case 2.—A 21-year-old soldier sustained wounds of the right arm and forearm with complete ulnar and partial median nerve paralysis on 25 July 1950. Early in August he experienced constant burning pain in the right hand which was still present when he was examined on 11 September. At that time the right palm was mottled, dusky, and cool. In the ensuing 2 weeks, the patient received 4 intra-arterial injections of 50 mg. of priscoline in the right brachial artery with relief for 1½ hours with each injection. On 9 October 50 mg. of C6 given intravenously resulted in freedom from pain for 1½ hours. A 2-day course of C6 intramuscularly every 6 hours was begun, and each injection gave relief for one-half hour. Doses of 60 mg. on the second day did not improve the response. Placebos afforded slight relief for 30 minutes. On 18 October, he had a right dorsal sympathectomy and

since that time has had complete and lasting freedom from pain, and a markedly increased range of motion in the hand.

Case 3.—A 23-year-old soldier was struck in the right forearm on 16 July 1950, incurring a chip fracture of the radius, with damage to the median and ulnar nerves. After healing of his fracture, examination early in October revealed a dusky, warm, and profusely sweating hand, with severe and constant burning pain, particularly over the ulnar distribution. He was placed on a 2-day course of 50 mg. of C6 intramuscularly every 4 hours with no relief accompanying any injection. He fainted momentarily on arising 1½ hours following one dose. He required narcotics. When he was given 50 mg. of priscoline in the right brachial artery there was immediate relief of the burning for 30 minutes followed by an intense recurrence. A right dorsal sympathectomy performed on 31 October resulted in complete and lasting freedom from pain, return of the appearance of the hand to normal and increased dexterity.

Case 5.—A 19-year-old soldier incurred a wound of the left thigh, with incomplete sciatic neuropathy on 10 September 1950. Two days following injury he noted severe burning pain over the dorsum of the foot which persisted unchanged until treated. The skin over the left foot was glossy, cool, and moist. On 27 September, 50 mg. of priscoline injected in the left femoral artery gave immediate and complete relief of pain and partial return of the appearance of the foot to normal for 24 hours. The syndrome recurred unchanged in 48 hours. On 29 September, the same intra-arterial dose of priscoline gave the same pronounced relief, and the pain did not recur in its former intensity for a period of 1 week. The foot did not revert completely to its abnormal appearance. On 4 October, 50 mg. of C6 given intravenously produced complete relief for 30 hours followed by nearly complete relief for 7 days. The pain recurred at about one-half its former intensity. A placebo was without effect. On 11 October, an intramuscular dose of C6 produced complete relief for 1 week followed by a recurrence of the pain. Two additional intramuscular doses of C6 weekly produced complete relief for that period and each was followed by a milder recurrence.

Case 8.—A 20-year-old soldier incurred wounds of the left arm and anterior chest wall on 28 July 1950. There was incomplete radial, median and ulnar nerve paralysis, with severe burning pain, increased sweating, and extremely severe hyperesthesia of the left hand, starting almost immediately after injury. On 20 October, he was given 50 mg. of C6 intravenously, with immediate and complete freedom from pain and hyperesthesia for 3 hours, and partial relief for 3 more hours. The following day, a 3-day course of 50 mg. of C6 given intramuscularly every 6 hours was started. The dose was increased to 70 mg. on the

fourth day. Each administration of the drug gave complete freedom from pain, sweating and hyperesthesia for from 2½ to 3 hours, and partial relief until the next dose. The increased dose did not improve the response. Interposed placebos were ineffectual. On 25 October a left dorsal sympathectomy was performed. This has resulted in the complete cessation of pain and hyperesthesia.

DISCUSSION

These cases illustrate the range of responses to C6 in causalgia. Relief of pain varied from none to complete freedom from pain as long as intramuscular injections were given every 6 hours. No explanation can be given for this variation in response to the drug, despite universal benefit from sympathectomy. The relation of intravenous to intramuscular administration of the drug is also inconstant. No patient received regularly spaced intravenous injections of C6, but all intramuscular injections were given at 6-hour intervals for prolonged periods. It appears that intravenous doses usually gave more relief and for longer periods than intramuscular doses but the advantages of regularly spaced intramuscular doses outweigh the benefits of the intravenous use of the drug.

The response of causalgia following peripheral nerve injuries to C6 in this small series was temporary and palliative. The drug seemed to be of benefit. Sympathectomy, however, remains the treatment of choice for most patients, and especially for those not showing a permanent response to medical therapy. Further study is necessary before the drug can be fully evaluated in the treatment of causalgia, but certain possibilities for its clinical use suggest themselves. In the milder and the subsiding cases C6 may shorten the course of causalgia as indicated by the milder recurrences seen in 2 of the patients in this series following its use. C6 may also find a place in the maintenance of relative comfort for the patient awaiting sympathectomy. With less reliability, it may aid in distinguishing causalgia from other painful states of the extremities which will not respond to sympathectomy.

SUMMARY

Hexamethonium (C6) has received a brief clinical trial in the treatment of 10 patients with causalgia complicating peripheral nerve injuries. Five cases illustrating various responses to the drug are abstracted, and some comparisons drawn between C6, intra-arterial priscoline, and sympathectomy. A favorable response to C6 occurred in 9 out of 10 cases though sympathectomy was required in 7 out of 10 cases for complete and lasting relief of pain. There is evidence that C6 may deserve further consideration in the management of this syndrome.

Bronchiolitis in Infancy (1)

Clinical Study With Special Emphasis on the Cardiac Complications

Arvin T. Henderson, *Lieutenant, MC, U. S. N.* (2)

S. Rosenzweig, *M. D.*

THE refractiveness to treatment of a syndrome seen only in infants and generally called bronchiolitis is in contrast to the advances in chemotherapy. Early clinical bacteriologic recognition of various respiratory disorders is imperative if full advantage is to be taken of the advances in both specific and adjunctive therapy. Bronchiolitis must be separated from other acute respiratory diseases because recovery depends almost entirely on symptomatic treatment and nursing care. Bronchiolitis derives its name from the fact that the greatest pathologic changes occur in the bronchioles, although, like other respiratory diseases, the entire respiratory tract is involved. The areas chiefly affected appear, anatomically, to lie between the large airways and the alveoli and, in this respect, bronchiolitis can be likened to such conditions as asthma or the pneumonitis of pertussis.

It has never been proved conclusively whether bronchiolitis is a specific disease caused by a specific organism or whether it is merely an anatomic diagnosis. The causative agent is unknown. Over the past 40 years this disease has been described under such terms as peribronchiolar pneumonia, capillary bronchitis (3), interstitial bronchopneumonia (4), pneumonitis, and obstructive emphysema (5). Blake and Cecil (6) were able to produce a peribronchiolar infection by introducing pure cultures of *Hemophilus influenzae* into the respiratory tract;

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(1) From the Department of Pediatrics, Children's Hospital, Detroit, Mich., and Wayne University College of Medicine.

(2) Now on duty at U. S. Naval Hospital, San Diego, Calif.

(3) Brennemann, J.: Practice of Pediatrics. W. F. Prior Co., Inc., Hagerstown, Md., 1947. p. 165.

(4) MacCullum, W. G.: Pathology of pneumonia in U. S. Army camps during the winter of 1917-1918. Rockefeller Institute, New York, 1919.

(5) Nelson, W. E., and Smith, L. W.: Generalized obstructive emphysema in infants. J. Pediat. 26: 36-55, Jan. 1945.

(6) Blake, F. G., and Cecil, R. L.: Production in monkeys of an acute respiratory disease resembling influenza by inoculation with bacillus influenzae. J. Exper. Med. 32: 691-717, 1920.

and McCordock (7) produced mural bronchiolitis by placing canine distemper virus into the trachea of a dog and following it 2 days later with pyogenic bacteria. Goodpasture, et al. (8) examined the lungs of infants who died of bronchiolitis and found inclusion bodies in the epithelial cells of the bronchioles. From this he incriminated a virus as a causative agent. Mitchell and Nelson (9) believe acute bronchiolitis to be caused by agents acting synergistically or by one superimposed on the other.

Though the sterotyped course and the tendency to occur in circumscribed outbreaks suggests a specific agent, the syndrome may merely represent the infant's response to a prevailing organism which in older persons elicits only mild upper respiratory symptoms. The clinical difference between the manifestations in infants and in older persons could be attributed to the relatively thinner and less rigid thoracic cage, to the tendency for predominately abdominal breathing, to the relatively large amount of interstitial tissue in relation to bronchiolar and alveolar space, and to the small lumen of the bronchioles.

A study has been made of 457 infants and children with bronchiolitis admitted to Children's Hospital, Detroit, Mich. Of these, 102 were observed between 15 December 1948 and 20 April 1949. Because the policy of Children's Hospital is to admit only seriously-ill patients, those with mild bronchiolitis were seldom hospitalized. This study, therefore, concerns a group of selected patients all of whom were seriously ill and in it we wish to review the clinical aspects of bronchiolitis and also to call attention to hypoxemia and cardiac involvement, two conditions which have not been stressed in previous studies.

Bronchiolitis is essentially a disease of winter and spring, and the rate of hospital admissions parallels that of bronchitis and pneumonia. Ninety-five percent of the patients were below the age of 1 year. The incidence was highest in the 2-month age group, although the youngest patient was 2 weeks of age and the oldest 3 years.

CLINICAL COURSE

The clinical course is fairly constant and typical but has many variations. After a 1- to 7-day invasion period, characterized by upper respiratory tract inflammation, cough, and increased rhinorrhea, the respiratory rate increases and evidence of respiratory obstruction appears. Hoarseness and fever are not outstanding at this stage although the pulse be unduly rapid. Symptoms progress rapidly in severity within the next few days, with frequent and distressing paroxysms of coughing. Wheezing is often audible from a distance. As these symptoms

(7) McCordock, H. A.: Further evidence of virus nature of interstitial bronchopneumonia. Proc. Soc. Exper. Biol. & Med. 30: 508-511, Jan. 1933.

(8) Goodpasture, E. W.; Auerbach, S. H.; Swanson, H. S.; and Cotter, E. F.: Virus pneumonia of infants secondary to epidemic infections. Am. J. Dis. Child. 57: 997-1011, May 1939.

(9) Mitchell, A. G., and Nelson, W. E.: Textbook of Pediatrics. 4th edition. W. B. Saunders Co., Philadelphia, Pa., 1947.

increase in severity, bronchiolar obstruction with resultant symptoms of hypoxemia becomes evident and restlessness and cyanosis may become severe; this is the stage in which most patients are admitted to this hospital. The course then varies with the severity of the disease and the treatment instituted. In most patients the cyanosis and restlessness disappear and the patient progressively recovers.

Signs of cardiac distress and electrocardiographic evidence of myocardial damage appeared in several of our patients, although in even the more severe and more stubborn cases there was usually a steady turn for the better. In 5 percent of our series signs of hypoxemia increased and death occurred from 1 to 6 days after hospitalization.

PHYSICAL EXAMINATION

Physical examination during the first phase reveals the usual signs of upper respiratory infection such as rhinorrhea and injected nasopharyngeal mucosa. As the condition progresses respiratory difficulty increases and the rate becomes rapid. The soft parts of the chest retract with inspiration and the auxiliary respiratory muscles are brought into action. Air exchange is poor and expiration prolonged. On percussion the chest is tympanitic. The ribs are farther apart and more horizontal than usual. On auscultation the breath sounds are diminished in intensity, often wheezing in character, and appear quite distant.

Rales are heard throughout the chest, with rales of a high-pitched musical character audible on expiration. Moist bubbling may be transmitted from the bronchi and trachea, but is muffled by the peripheral emphysema. Signs suggestive of consolidation are migratory; these are caused by transient obstruction of the bronchioles with small areas of atelectasis which tend to disappear quickly. The heart rate is more rapid than expected, and in severe cases is frequently over 200. There is an apparent decrease in the area of cardiac dullness because of the emphysema. The heart sounds appear distant and muffled, and frequently a gallop rhythm can be heard. The liver edge usually is found one or two fingerwidths below the costal margin. This may be caused by flattening of the diaphragm or by enlargement of the liver secondary to venous congestion. We found abdominal distention to be a problem only rarely.

TABLE 1.—*Distribution of peak temperatures*

Temperature peak (degrees F)	*Percent*
Under 100	20
100.1 to 101	16
101.1 to 102	32
102.1 to 103	10
Over 103	20

In our series, temperatures varied from normal to 105° F.; with 68 percent being below 102° F. The height of the fever was not always found to be a measure of the severity of the illness. Many of our most

critically ill patients had a normal temperature, and some less ill had high fever (table 1).

Roentgenograms of the chest at the height of the disease show signs of bilateral generalized emphysema. The bronchovascular markings may be increased, and near the bases and close to the hilar portions patches of atelectasis and infiltration may be noted. The diaphragm is flattened and depressed and a limitation of excursion can be noted on

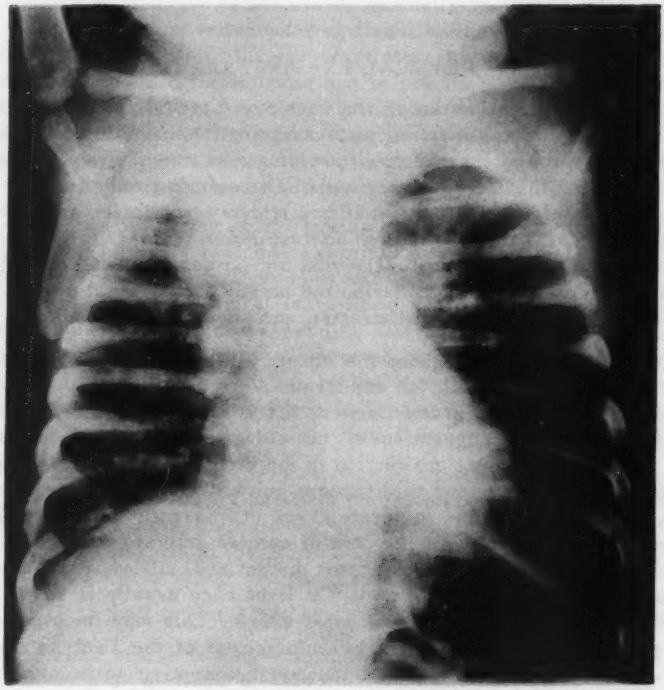

Figure 1.—Roentgenogram of a 3-month-old female infant, taken on the third hospital day. Consolidation and atelectasis are seen in the right upper lung field. Elsewhere the lung fields are emphysematous and the leaves of the diaphragm are flattened.

fluoroscopy. Usually there is no abnormal change in the shadow of the trachea. The heart size is, in most cases, smaller than one would expect from the clinical cardiac signs *(10)* (figs. 1 and 2).

(10) Paul, L. W.: Roentgenologic diagnosis of acute bronchiolitis (capillary bronchitis) in infants. Am. J. Roentgenol. 45: 41-49, Jan. 1941.

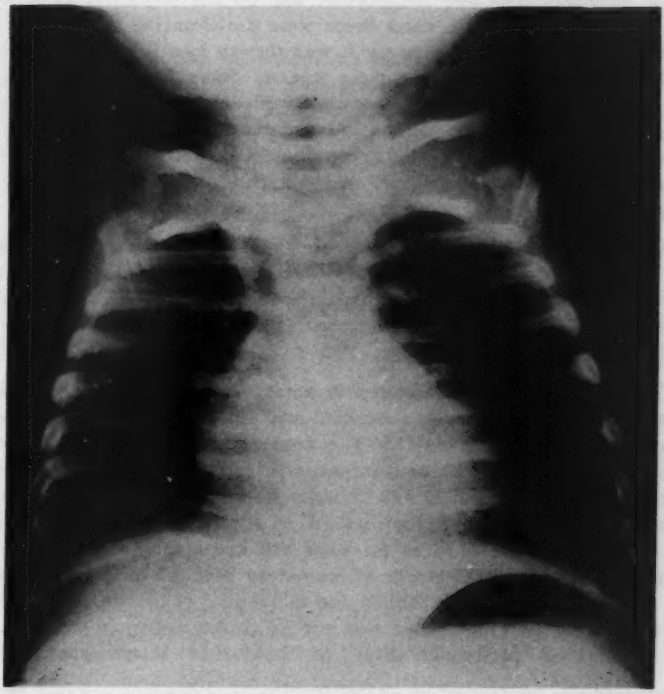

Figure 2.—Roentgenogram of the same infant taken 6 weeks later. Pneumonic infiltration, atelectasis, and emphysema have disappeared and the contour of the diaphragm is normal.

PATHOLOGY

In the past 3 years 9 patients with the clinical features of bronchiolitis died and autopsies were performed. In 2 of these, although the diagnosis was bronchiolitis, at autopsy it was found that other conditions accounted for death (one had congenital heart disease and the other had fibrocystic disease of the pancreas) and therefore they are not included. A study of the other 7 revealed great variation in the pathologic findings, as opposed to the rather characteristic clinical picture *(11)*. Common gross findings were patchy atelectasis and emphysema and various degrees of congestion. In 4 of the 7 patients, mucoid material was found in the small bronchi.

The principal microscopic changes were found in the bronchioles, but in some patients were also present in the bronchi; the walls were

(11) Bryan, A. M.: Personal communication. Sept. 1949.

thickened by an infiltration of lymphocytes, plasma cells, and occasional polymorphonuclear leukocytes, and by the engorgement of vessels in these regions. In some there were proliferative changes in the epithelial lining; not uncommonly it was thrown into folds either by the proliferation or by smooth muscle spasm. Some bronchioles showed only minor changes whereas others showed denuding and sloughing of the epithelial cells. The lumens in most cases contained some mucoid material, polymorphonuclear leukocytes, and cellular debris. Other lumens were clear or contained a little fluid. Inclusion bodies were sought in the epithelial structures but were not found.

Throughout the lung parenchyma the changes of patchy atelectasis and emphysema were apparent; bronchopneumonia was also present in one. In two there was a mild degree of patchy pneumonia, chiefly peribronchial in distribution. In all autopsies it was noted that the alveolar walls were congested.

The changes found at autopsy in some but not all, of these cases were quite similar to those described as "proliferative mural bronchiolitis" by Engel and Newns *(12)* who considered the causative agent to be a virus and believed that true pneumonia could develop as a consequence of the bronchiolitis and alveolar collapse. In view of the variability in the microscopic findings, it is impossible to say just what the basic pathologic process is. Some had mucus plugs in bronchioles with practically no evidence of inflammatory process in the wall; others had marked inflammatory changes and thickening of the wall. Apparently infection from the bronchioles may spread to the nearby alveoli to give the findings of "peribronchiolitis" or "interstitial bronchopneumonia."

Myocarditis, evidenced by an infiltration of polymorphonuclear leukocytes and monocytes in the myocardium in a small proportion of children dying of lobar and bronchopneumonia, has been described by Saphir and others *(13)*. In our cases there was no cellular infiltration but in 4 of the 7 there was edema of the myocardium and in 3 there were degenerative changes in the nuclei of the muscle fibers evidenced by variability in size, shape, and staining qualities.

LABORATORY FINDINGS

Leukocyte counts on admission varied from 5,100 to 31,000 with most of the counts below 15,000. A lymphocytosis of over 50 percent was found in 59 percent and a neutrophilia in 41 percent of the patients. Under normal conditions a lymphocytosis is the rule in this age group. Twenty percent of the patients had a monocyte count above 6 percent, and ranging up to 21 percent which was present in 2 patients. We are not stressing this latter point because of the variability with which various laboratory technicians differentiate between large lymphocytes and mononuclear cells, and also because of the frequency of an in-

(12) Engel, S., and Newns, G. H.: Proliferative mural bronchiolitis. Arch. Dis. Childhood. 15: 219-222, Dec. 1940.

(13) Saphir, O.; Wile, S. A.; and Reingold, I. M.: Myocarditis in children. Am. J. Dis. Child. 67: 294-312, Apr. 1944.

creased mononuclear count in this age group. As with the temperatures, the height of the leukocyte count did not reflect the severity of the infection.

With the thought that the causative agent was a virus, tests for cold agglutinins were made on 21 patients. In 16 the tests were negative; in 2 agglutination occurred at a dilution of 1:64 and in 3 at a dilution of 1:32. The titers did not increase nor show correlation with the stage of the disease. Nose and throat cultures were made on all patients on admission on 1 blood and 2 chocolate plates; 1 of the latter was incubated at partial oxygen tension. No attempt was made to isolate a viral agent. From 84 percent of the cultures multiple organisms were grown; 11 percent showed only *Staphylococcus aureus,* and 5 percent *Staphylococcus albus* (coagulase positive). As can be seen from table 2, the flora was found to be quite comparable with that found in apparently normal throats in the winter *(14).*

TABLE 2.—*Distribution of organisms in throat cultures*

Organisms	*Percent of patients with positive culture*
Staphylococcus aureus	54
Staphylococcus albus	41
Streptococcus viridans	35
Neisseria catarrhalis	22
Hemophilus influenzae	21
Escherichia coli	15
Diplococcus pneumoniae	14
Streptococcus haemolyticus	13
Pseudomonas aeruginosa	2
Neisseria meningitidis	1

In 8 percent of the patients, blood cultures were found to be positive; *Diplococcus pneumoniae* was found in one and *Staphylococcus aureus* in the rest.

ELECTROCARDIOGRAPHY

Ebert and Stead *(15),* and others, have shown that the cardiovascular system is affected in many severe infections, often to a degree in which evidence of circulatory collapse is present. They concluded that it was not caused by loss of blood volume and that improvement came only with control of the underlying infection. Pratt *(16)* and Benward *(17)* mentioned the injury to the body from hypoxemia in bronchiolitis

(14) Smith, D. T., and Martin, D. S.: Zinsser's Textbook of Bacteriology. 9th edition. Appleton-Century-Crofts, Co., Inc., New York, 1948.

(15) Ebert, R. V.; and Stead, E. A., Jr.: Circulatory failure in acute infections. J. Clin. Investigation 20: 671-679, Nov. 1941.

(16) Pratt, E. L.: Symposium on specific methods of treatment; acute bronchiolitis in infants. M. Clin. North America 28: 1098-1107, Sept. 1944.

(17) Benward, J. H.: Acute bronchiolitis in children. Journal Lancet. 68: 24-27, Jan. 1948.

and commented on the cardiac involvement. Although there have been no published reports describing electrocardiographic changes, Rubin *(18)* found such changes clinically as well as at autopsy.

In observing our patients with bronchiolitis we noted that in those with severe hypoxemia, the pulse rate was faster and the heart tones more distant than in the milder cases. ECG's on these patients usually showed evidence of myocardial involvement. At autopsy no cellular infiltration of the myocardium was found; but in four cases there was edema and three showed degenerative changes in the nuclei of the muscle fibers.

The edema of the myocardium and the degenerative changes in the nuclei are probably explained on the basis of hypoxemia, toxemia, and obstruction of the pulmonary blood flow. These factors probably account for the electrocardiographic changes as well.

ECG's with the three conventional leads in 45 of the sickest patients showed an abnormality in 37 percent. These changes, however, did not tend to follow a pattern. When similar studies were made on patients with other infections, abnormal ECG's were found; for instance, they were found in 14 percent of the patients with poliomyelitis. The ECG may show such deviations from the normal as abnormal rhythm, disturbances in the Q-T and P-R intervals, deformity or change in potential of the QRS complex and the T-waves and significant displacement of the RT segment. Among the electrocardiographic changes which are not considered abnormal are changes in rate, especially tachycardia, P-wave changes, changes in voltage, and axis deviations.

An important conclusion from the study was that the electrocardiographic abnormalities in all patients who survived were reversible.

TABLE 3.—*Distribution of abnormal electrocardiographic changes*

Electrocardiographic changes *	*Number of patients*
Abnormal rhythm	2
Frequent extrasystoles	1
Paroxysmal tachycardia	1
Abnormal QRS segment	3
Abnormal T_1	12
Abnormal T_2	9
ST displacement	7

*Abnormal P-R or R-T intervals were not observed in this series.

Serial ECG's of 17 patients (37 percent of those on whom ECG's were made) showed a grossly abnormal form (table 3).

Abnormality in the QRS complex in three tracings consisted in broadening, slurring, or splintering of the RS segment. Abnormality in the T-wave was the most common deviation, which is true, too, in most infections which alter the normal tracing. T_1 was more abnormal

(18) Rubin, M. I.: Personal communication, Sept. 1949.

than T_2. The changes encountered in the T-wave were low amplitude (under 2 mm. for lead I; under 1 mm. for lead II), inversion, notching, grossly bizarre deformity, isoelectric T-wave, and a diphasic T-wave. One beaked T-wave was encountered. Displacement (over 2 mm.) in the RT segment occurred in seven ECG's.

TREATMENT

Bronchiolitis is a self-limited disease and in most instances is unaffected by antibiotics. Treatment with aureomycin, streptomycin, penicillin, or sulfadiazine caused little difference in the length of hospital stay in our series except in isolated cases. As a general rule the patients respond poorly to chemotherapy. Because of the occasional dramatic relief of symptoms, because of the presence of bacteremia in 8 percent of the patients, and in view of the patients' age and susceptibility to many types of organisms, sulfadiazine is indicated with or without the aid of penicillin.

The more serious clinical signs observed are caused by hypoxemia resulting from the poor oxygen exchange. As a rule, recovery occurs when the oxygen exchange is improved and the oxygen need is satisfied. Treatment, therefore, should be aimed towards that end. The use of oxygen plus cold steam (aerosol water vapor) was found to be the most effective method for relieving the bronchiolar obstruction. The high humidity acts to decrease both the amount and the viscosity of bronchial secretion. In some patients the dyspnea and cyanosis fail to respond to this treatment in which case it may be supplemented with helium to decrease the density of the gases and thus allow them to pass through the partially plugged bronchioles with greater ease.

As restlessness is usually extreme, small amounts of a sedative (4 cc. of whisky to 8 cc. of sugar water; or up to 0.03 gram of amytal or pentothal) may be given, care being taken not to depress respiration. This also helps to relieve the apprehension and to decrease the oxygen need.

Overhydration and abdominal distention are seldom problems so that fluids and food can be offered as desired. Intravenous fluids should be used with caution as an overload of the pulmonary circulation may result. Small transfusions, however, frequently seem to be of benefit. Gamma globulin was given to a few patients but no dramatic results were noted.

Digitalis was given to a few patients showing electrocardiographic and clinical evidence of heart failure; it slowed the pulse and strengthened the heart beat. Stimulation with caffeine sodiobenzoate may be required. Some relief was occasionally obtained with the use of antihistaminics or aminophylline, but usually there was little response to these drugs. General supportive measures with good nursing care are of prime importance.

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SUMMARY AND CONCLUSIONS

Epidemiologically, bronchiolitis is a disease of winter and spring and parallels in incidence the other respiratory infections. Its greatest incidence occurs in the 2- to 4-months age group. Absence of evidence incriminating a specific etiologic agent leaves bronchiolitis an anatomic diagnosis. The underlying pathologic changes vary from a mere catarrhal plugging of the lower bronchioles to a leukocytic infiltration through the bronchiolar walls into the interstitial tissues. Emphysema is always present. The treatment of choice is the prophylactic use of sulfadiazine, oxygen and cold water vapor, mild sedation, symptomatic treatment, and good nursing care. Of prime importance should be the prevention—of contact of the newborn and infants up to 8 months old with persons having respiratory infections. Hypoxemia, toxemia from the infection, and the increased strain on the cardiac muscle from the pulmonary congestion induces reversible cardiac damage. ECG's were abnormal in 37 percent of those on whom ECG's were made. These changes were diffuse and followed no specific pattern. Because there were no changes in the P-R segment and recovery was the rule, probably the changes noted were caused by a temporary functional maladjustment.

An Unusual Foreign Body in the Nose

Albert H. Williams, *Major, MC, U.S.A.* (1)

A 22-YEAR-OLD soldier was riding in the right side of the front seat of an automobile when it crashed into a tree. He was brought into the hospital with a triangular wound of the right external wall of his nose covered by a moderate amount of dried blood. There was a slight deformity of the nose. A roentgenogram (fig. 1) showed what appeared to be, at first glance, an avulsive fracture of the bony septum. The degree of opacity, however, and the definite demarcation of the edge of the fragment, the sides of which measured 3, 3, and 3.5 cm., suggested a foreign body. Removal of blood clots from the right nostril revealed the edge of a thick piece of glass lying in the right nasal cavity parallel to the septum. Inasmuch as there was no laceration of the vestibule it was deemed less traumatic to remove the glass fragment (fig. 2) through its portal of entry. The right external nasal artery, the right lateral wall of the nose, and the septum were cut by this foreign body, necessitating a plastic repair. Much of the nasal mucosa was destroyed but no fractures were demon-

Figure 1.—Roentgenogram showing foreign body in the nose.

(1) U. S. Army Hospital, Fort Devens, Mass.

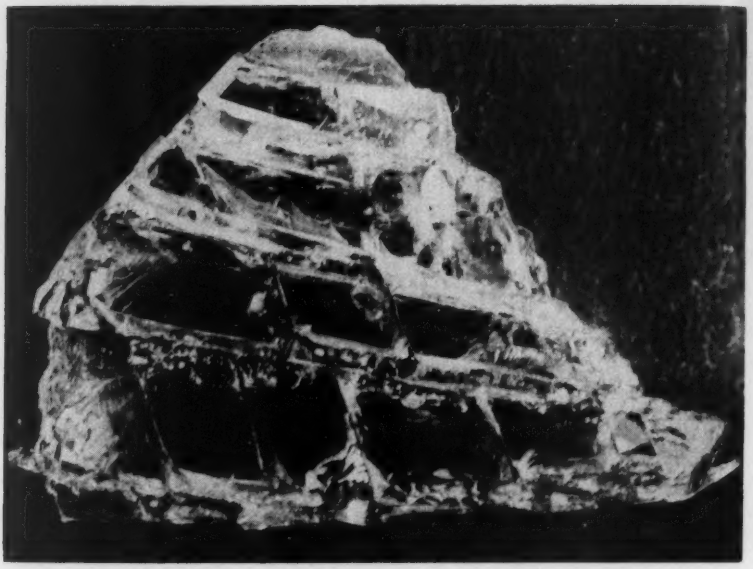

Figure 2.—Foreign body after removal from nose.

strated. No infection ensued and rapid healing took place so that there was no change in the appearance of the nose. No permanent perforation of the nasal septum remained. The foreign body consisted of two layers of glass containing a highly radiopaque mineral substance cemented to each side of a sheet of celluloid.

An Illuminated Endotracheal Stylet

David E. MacQuigg, *Major, MC, U. S. A.*

AN industrial extension flashlight has proved to be an excellent illuminated endotracheal stylet. The handle of the flashlight is a standard penlite with an extension of 1/8-inch malleable steel using a "grain of wheat" instrument bulb (fig. 1). The light may be purchased with extensions of various length, but for endotracheal work an extension of no longer than 12 inches is best. The use of a stylet is not routine in our endotracheal work, but when its use is indicated, the added feature of an illuminated stylet has been helpful, especially

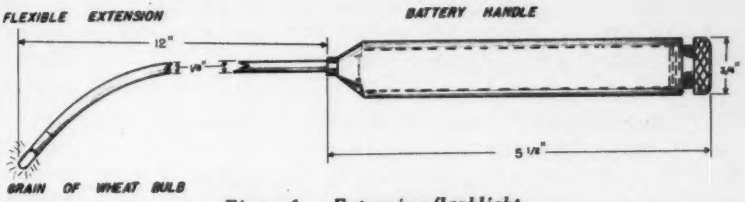

Figure 1.—Extension flashlight.

for examining the vocal cords while intubating and in patients in whom there is trauma of the pharynx with bleeding. It allows the operator to locate the tip of the endotracheal tube even if it is covered by blood. This feature is more noticeable when the translucent Portex tubing is used as the light shines easily through the tubing and illuminates the oral pharynx.

In performing an emergency intubation on two occasions the lamp of the laryngoscope failed just as intubation was being attempted, but the illumination furnished by the stylet was adequate to complete the intubation with ease, saving time and making another attempt at intubation unnecessary.

Treatment of Frostbite

Report of a Case

Jack Fishman, *Lieutenant Commander, MC, U. S. N. R.*

THE patient was a 44-year-old white woman who 27 years prior to her coming under my care had suffered frostbite of her legs. Following this she had multiple ulcerations of both legs which healed with local therapy. However, the scars would break down so that some ulceration was almost always present. During cold weather, the patient suffered extreme pain, numbness, and stiffness in her legs, causing her to be totally incapacitated. It was necessary at such times for her to wear several layers of woolen cloth on her legs to afford added relief and protection. In addition, she was able to go outdoors for only very short periods of time.

Examination of the lower extremities revealed several discrete ulcers on the lower portions of both legs. Many pigmented scars were found, indicating healed ulcers. The surface temperature of both legs was usually low. The dorsalis pedis and popliteal artery pulsations were of poor quality.

Priscoline (benzazoline hydrochloride) therapy was instituted. The patient was given 12 injections of 2 cc. (50 mg.) each, every 3 days into the femoral arteries and 25 mg. were given orally t. i. d. for 6 months. A favorable response to this form of treatment was immediate. The ulcers healed spontaneously within several weeks. The pain disappeared after the second injection and the legs were constantly warm and limber thereafter. The pigmented healed areas became lighter in appearance. The patient was able to discard her woolen coverings and go outdoors for longer periods in the winter months. The surface temperature of her lower extremities improved as did the quality of the dorsalis pedis and popliteal artery pulsations. Six months after discontinuing the treatment, the patient was still symptom-free and entirely well without any further medication.

ARTICLES PUBLISHED BY PERSONNEL OF THE MEDICAL SERVICES OF THE ARMED FORCES

Kelly, LeMoyne C., Commander, MC (S), U. S. N. R.: Effective Management of the Rheumatic Diseases with Special Consideration of the Role of Physical Agents in Treatment. The American Practitioner and Digest of Treatment 1: 1300-1302, Dec. 1950.

Schermer, Robert, Capt., DC, A. U. S.: Prosthetic Rehabilitation in Oral Cancer. Dental Items of Interest, Feb. 1951.

Van Eycken, Ernest J., Lt. Col., MC, U. S. A., and Cox, L. G., Capt., MC, U. S. A.: Traumatic Hematoma of the Larynx. Annals of Otology, Rhinology and Laryngology 60: 253, Mar. 1951.

Boards, Certificates, and Psychiatric Reports

Donald B. Peterson, *Colonel, MC, A. U. S.* (1)

THIS article consists of a series of comments on implementation of regulations which are interrelated because they have as a common denominator the vagaries of human behavior. In one way or another these vagaries affect all members of the Armed Forces, and create a major problem to the military medical officer. Although the following is written as an aid to the Army psychiatrist in a general hospital, and may be used in cookbook fashion in the handling of specific problems, careful perusal will reveal a philosophic continuum from which attitudes and concepts may be derived which enable any Army medical officer to see and act in accordance with the principle behind the regulation. In extreme cases, medical officers have been known to take pleasure from the execution of a clear, logical, well-planned bit of paper work. The subject matter is timely because of the expansion of the Armed Forces and the influx of young doctors whose military and forensic training is only starting.

The psychiatrist is concerned primarily with the care of the sick. It is possible to accomplish this primary mission only if proper administrative procedure is carried out accurately and expeditiously. Because much administration is directly involved with boards, certificates, and reports dealing with the sanity, personality, or other mental, emotional, and behavioral attributes of patients, a thorough and practical understanding of such procedures is prerequisite to the successful practice of psychiatry in the Army.

The publications listed in table 1 are part of the working knowledge of the Army psychiatrist.

Boards, certificates, and reports are similar in that their function is to provide specified information to certain persons under certain circumstances. Just what information is to be provided and to whom it should be directed may be specified, or these may be implicit in the circumstances. For example, an untried prisoner may be referred spe-

(1) Fitzsimons Army Hospital, Denver, Colo.

TABLE 1.—*Publications frequently used*

Code number	*Title*	*Remarks*
AR 420-5, 20 May 1940	Boards of Officers for Conducting Investigations	General rules and procedures for boards, investigations, and taking of evidence.
TM 8-240, Sept. 1950 AFM 160-42	Psychiatry in Military Law	
	Manual for Courts-Martial, U. S., 1951	Chapter 24, par. 120-124, Insanity.
SR 600-500-5, 29 Apr. 1949 AFR 160-24	Personnel—Psychiatric Evaluation Prior to Referral to Boards	
AR 600-450, 7 Nov. 1949 AFR 39-11	Personnel—Separation for Physical Disability	Medical boards and physical evaluation boards.
SR 600-440-1, 7 June 1949	Personnel—Disposition of the Psychotic	Including general prisoners.
SR 615-360-40, 25 Aug. 1950 AF PMP-4H 3 & 211	Enlisted Personnel—Disposition of Individuals with Physical or Mental Disability	Discussion of administrative elimination of enlisted personnel and authority for acceptance of resignation of enlisted personnel with existing prior to service (EPTS) physical disability.
AR 615-366, 26 Oct. 1949 AFR 39-21 and AFR 39-23	Enlisted Personnel—Misconduct, Fraudulent Entry, Absent Without Leave, Desertion, Conviction by Civil Court	Par. 9—physically unfit deserters and absentees; par. 2h—fraud, concealment of physical defects.
AR 600-443, 12 Jan. 1950 AFR 35-66	Personnel—Separation of Homosexuals	
AR 615-368, 27 Oct. 1948 AFR 39-17	Enlisted Personnel—Discharge, Unfitness	
AR 615-369, 27 Oct. 1948 AFR 39-16	Enlisted Personnel—Discharge, Inaptitude or Unsuitability	
AR 345-415, 14 Aug. 1945	Military Records—Daily Sick Report	Investigation of line of duty.
AR 605-200, 26 Jan. 1951 AFR 36-2	Officers—Demotion and Elimination	
AR 40-590, 21 Jan. 1946	Medical Service—Administration of Hospitals, General Provisions	Authorizes the commanding officer of a hospital to appoint a disposition board to advise him in such cases as he considers necessary.

cifically for action under par. 121, Manual for Courts-Martial (MCM). Usually, however, he is just sent to the hospital for mental observation. This circumstance implies referral and authorizes taking action under par. 121, MCM. It would be uneconomical to enter into correspondence with the unit commander merely to get a formal affirmation of what is already intrinsically authorized by the circumstances.

A *report* is an informal document without legal standing. It is useful to convey information in any case in which there is no possibility that evidence is required.

A *certificate* by an officer is similar to an affidavit in that an officer puts himself under oath by the act of signing a certificate. He makes himself responsible for the truth of the document. Any document becomes a certificate when an officer signs a statement containing the words, "I certify ....." A certificate is usually admissible as evidence to a board such as convened under AR 615-368, but not to a court martial. Often the brief clinical history of an AR 600-450 board is certified in the event that the board and certificate may be used in evidence by by other boards, such as those convened under AR 615-368 or in court martial investigations. Although under certain circumstances a certificate is useless as evidence because it is not "best evidence," it is useful in relation to command action. For example, although a court cannot take cognizance of a certificate, the certificate often is instrumental in determining whether the accused is to be tried or not.

Boards are authorized by various regulations and their purpose may be specific or general, depending on the regulation. They are convened to give command authority the benefit of the mature, considered, expert, and informed judgment of experienced officers. The use of boards is an attempt to give command a complete and accurate report on which to base a decision. In most cases, great latitude is given the board in making findings and recommendations so that the broad purposes of any board are well served.

Mechanics and elements.—The formality of the document is greatest in the board, least in a report, and within each type of document varies with the regulation, purpose, and ground rules of the command. In general the following features and headings are standard (fig. 1): (1) heading which includes the title of the document, the authorizing regulation and the date, (2) the diagnosis, (3) pertinent history, (4) expert interpretation of the diagnosis, presenting the salient features in nontechnical terms, (5) findings, (6) comment which is optional but useful in arriving at recommendations, (7) recommendations, and (8) signature with title because the title indicates the role of the psychiatrist concerning the particular case rather than his duty designation of ward officer.

Almost all board reports are submitted on WD AGO Form 8-118. This form is required for AR 600-450 boards, and is convenient for other

FITZSIMONS GENERAL HOSPITAL
DENVER, COLORADO

.....

CERTIFICATE

I certify that this is the report of neuropsychiatric examination in the case of

Grade Name ASN Organization
who was admitted to this hospital on.....; and that after careful examination the diagnosis is found to be:

(Use same code number and nomenclature as given in Final Summary and on Form 55a)

Pertinent History:

Mental Status:

This condition is characterized by:

In my opinion, the soldier is not insane, possesses sufficient mental capacity to know the difference between right and wrong; should be able to adhere to the right, and refrain from the wrong; and is considered to be mentally responsible for his acts.

This condition is not amenable to hospitalization, treatment, disciplinary action, training, transfer to another station or organization, or reclassification to another type of duty. This soldier has no mental or physical disease or defect which warrants CDD or other disposition through medical channels.

Recommendation: That this soldier be continued on duty until command decision is reached as to whether or not he should be retained in the Service. In the event that his performance is such that he is deemed to be useless to the Service, the soldier should be separated from the Military Service under the provisions of AR 615-36 because of

.....
MC
Neuropsychiatrist

FGH Form No. 128-a

Army-Ogden, Utah-7187

Figure 1.

boards. With this exception no printed form is necessary. The whole board proceedings may be typed on blank paper. All copies of board proceedings are signed by all members except the AR 600-450 and AR 40-590 boards in which the original is signed and the first copy initialed by only the president and recorder. *All copies, including file copies, of certificates must be signed.* An unsigned document labeled "certificate" is not a certificate and is without value. Further findings not covered by the form are made as necessary and any inapplicable findings printed on the form are labeled DNA (does not apply).

To fulfill their purposes these documents must be clear and logical, and the reasoning involved must be intelligible to the layman. The diagnosis and its interpretation must be backed up by the history, and the findings must support the recommendations. Further, these documents must be legible. Because from 6 to 8 copies are often required, if at all possible, the original should be on onionskin paper. Such paper can be mimeographed if a sheet of blank onionskin paper is inserted between each printed sheet to come off the roller. People may resent this extra effort and may even claim it is impossible, but the medical effort is wasted if the document is illegible. In the preparation of copies of forms, care must be taken that the forms are in register during typing. All this is obvious but nonetheless often becomes a major problem. The various regulations specify the elements that are essential to make findings and recommendations for positive action. Unless these elements exist and *are recorded in the document,* the whole effort is ineffective and wasted.

ACTION REQUIRED PURSUANT TO SPECIFIC REGULATIONS

AR 600-450.—With certain exceptions military personnel are separated through medical channels when unfit for further duty by reason of physical or mental disability. Disorders such as pathologic personality, character and behavior disorders, immaturity reactions, and mental deficiency are considered to be personality variations rather than diseases. If a patient has a psychosis (see SR 600-440-1), the board will make the following findings: (1) diagnosis; (2) whether or not he can be released from military control without danger to himself or others; (3) whether or not he has the mental capacity to understand the nature of the board proceedings and to conduct or cooperate in them; (4) that he has attained maximum benefit from military hospitalization; (5) whether he should be discharged into his own care, the custody of his family, or to another hospital; (6) how many attendants, if any, will be required when he is transferred from the hospital; and (7) such other pertinent findings as his ability to distinguish right from wrong and to adhere to the right are required when some offense is alleged.

The AR 600-450 board, i.e., the "medical board," is in general similar to the old AR 40-590 disposition board, in that recommendations of referral to Physical Evaluation Boards, to boards convened under AR 615-368, AR 615-369, or AR 605-200, may be made as well as

recommendations of return to duty, with or without limitations. Many patients reach a general hospital who perhaps would not, if the referring hospital were more liberally staffed psychiatrically. The patient may have exaggerated some trifling complaint in an effort to avoid duty. The patient's physical condition often does not warrant a medical board but the circumstances may call for it. In case of doubt it is well to hold a formal medical board or an AR 40-590 disposition board, since such action becomes a matter of permanent record and carries more weight than the fact that the patient was hospitalized and the ward officer returned him to duty. The board report becomes a part of the Field 201 file and those who must deal with the patient on duty have a right to know the result of the medical deliberations. Conversely, care must be exercised to see that the material in the brief clinical history is material and relevant, and that personal material that is inconsequent to the issue be kept out of this record of patients returned to duty. Suitable accompanying papers or exhibits may be necessary, e.g., if a recommendation is made for Veterans' Administration or state hospitalization or discharge to relatives, a 10-P-10, authorization from the state, or acceptance from the relative is necessary. A brief clinical history is always required.

SR 600-440-1, par. 9. (Disposition of general prisoners).—The findings and recommendations required of boards convened under this regulation are explicitly stated therein and will not be repeated here. An SR 600-440-1 and AR 40-590 board must be accomplished at least 60 days prior to expiration of sentence. If this is impracticable, the reason for delay must accompany the board.

SR 615-360-40 permits persons unfit for military service because of physical or mental disability which existed prior to service and was not aggravated by service to submit application for discharge for the convenience of the government and presents a discussion of administrative elimination of enlisted personnel. Similar procedure is authorized for Air Force patients per authority of AFR 39-14 and AF PMP-4H 3 & 211. A medical board held in such cases must make the following findings: (1) diagnosis, (2) that the condition existed prior to entrance on present period of active service, (3) that the condition was not incurred in line of duty during a prior period of active service, (4) that the condition has not been aggravated during prior or present service, and (5) that the soldier has submitted his request for discharge. If all these findings can be made, a recommendation for discharge for convenience of the government is indicated; otherwise the recommendation should refer him to a Physical Evaluation Board. The application for discharge is submitted with the board proceedings.

Manual of Courts-Martial, U. S. 1951, par. 121 and 122c.—Psychiatric examination with a view to aiding in the determination of mental responsibility, psychologic factors, mitigating circumstances of offenses, and with a view toward making recommendations to command authority

regarding disposition in accord with the best interests of both the soldier and the government is authorized by the MCM, TM 8-240, and custom. MCM, par. 121, refers to pretrial psychiatric examination, and par. 114 to posttrial, preapproval psychiatric examination.

Although MCM par. 121 and 122c refer to a board of one or more medical officers and to the period between the preferring of charges and the approval of a sentence, it is customary for commanders to refer offenders for mental examination before charges are preferred. In such cases, ordinarily a certificate is executed rather than a board. Although an extremely brief certificate may fulfil the formal requirement, it must be remembered that in each such case, the psychiatrist becomes available to testify in person. Therefore it is best that the certificate be concise, rather than brief, and contain sufficient material to refresh his memory in the event he must testify in person. At a large army hospital, even in routine pretrial clearances and especially where inpatients are concerned, the tendency is to hold a formal board, since this procedure seems more considered and thoughtful and more in keeping with the time and effort already expended on the patient.

Separate and distinct coverage must be given the three "sanity findings":

1. Was the accused at the time of the alleged offense so far free from mental defect, disease, or derangement as to be able to distinguish right from wrong concerning the particular acts charged?

2. Was the accused at the time of the alleged offense so far free from mental defect, disease, or derangement as to be able to adhere to to the right concerning the particular acts charged? and

3. Does the accused possess sufficient mental capacity to understand the nature of the proceedings against him and to conduct or cooperate intelligently in his defense? It must be remembered that if the soldier is not under charges, he is not "the accused," but is to be referred to as "the individual," or "the soldier."

Recommendations from the psychiatric point of view suitable to the situation are made with consideration for the best interests of both the soldier and the service. Comment is often made as to whether or not a "bar to trial by reason of insanity" is believed to exist. The recommendation may be "none." Often there is little to be accomplished by trial, and a recommendation for administrative separation is indicated.

AR 615-366, par. 9 authorizes the administrative separation of physically unfit deserters and absentees. No board is required, though such disposition may be recommended by a board. Deserters and absentees who are *permanently incapacitated* by medical or surgical conditions, or by "*mental deficiency* or *constitutional psychopathy* who obviously *cannot be adapted* to military service" may be eliminated via this regulation. The document recommending this separation must find that: (1) the medical or surgical condition is permanently incapacitating in

that it is not temporary or curable within a reasonable period of time; or, (2) the mental deficiency or "constitutional psychopathy" (use those words) renders the soldier inadaptable to the military service; (3) the diagnosis as recorded constitutes a medical, surgical, or mental deficiency or a constitutional psychopathy (thus emphasizing that within the meaning of the regulation, neurosis is medical, and passive dependency is a constitutional psychopathy); and (4) in cases in which there might be a question of sanity (be very liberal), the patient had "the mental capacity to form the intent to desert." This is best accomplished by making the three "sanity findings" previously referred to.

AR 615-366, par. 2b authorizes administrative separation for fraudulent entry into the Army. The regulation relates to the "individual's procuring his enlistment or induction by concealment of *** a physical defect which would have made the individual ineligible for enlistment or induction." A true extract copy of NME Form 4 or SF Form 89 in cases of enlistment or induction respectively should be secured to show how the soldier answered the questions concerning his previous medical history. If a soldier who entered the service fraudulently possesses such qualifications that he is an asset to the service, the commanding general of an army in the zone of the interior may waive the right to discharge him for fraud. If this is done, further action or cognizance of the fraudulent entry cannot be taken during the current service. Implementation is accomplished by an AR 600-450 board which finds that the soldier has fraudulently entered the service, but that he possesses such qualifications that he is an asset to the service, and recommends that the right to discharge him for fraud be waived. Other pertinent recommendations such as "return to duty" are made.

AR 600-443 directs the "prompt separation of known homosexuals from the Army" as mandatory. The procedure and definitions of classes of homosexuality are specified in the regulation. AFR 35-66 is practically identical. The medical document is usually a certificate with the following findings: (1) diagnosis; (2) class of homosexuality (with a statement that the soldier is a true, confirmed, or habitual homosexual, or possesses only homosexual tendencies); (3) that the soldier did not claim uncontrollable, perverse tendencies for the purpose of avoiding further military service; (4) that the condition is not presently amenable to therapy and that further effort at rehabilitation will not make him of use to the military service; (5) (6) and (7), the three "sanity findings" because the soldier may come to trial.

AR 615-368 and AR 615-369 authorize the administrative separation of enlisted personnel because of (1) unfitness, (2) inaptitude, or (3) unsuitability generally caused by a pathologic personality, faulty attitudes, lack of motivation, unwillingness, or mental deficiency. SR 600-500-5 and AFR 160-24, state that hospitalization of such persons is usually unnecessary.

Basic policies:

1. "Non-effectives who are not disabled are to be disposed of through non-medical channels."

2. Continued effort will be made to screen and eliminate inapt and unsuitable persons. A soldier will be discharged by *AR 615-369* only when it is determined that he "cannot be *developed* to the extent where he may be expected to absorb further military training and/or become a satisfactory soldier."

3. "An individual who has demonstrated inaptness or unsuitability for military service, but whose psychiatric or physical condition is not such as to warrant discharge for disability, will be disposed of" under AR 615-369.

4. It is not necessary that a soldier be reduced in grade prior to his appearance before an AR 615-369 board.

5. A person will be discharged from the service by *AR 615-368* only when "it is definitely established *** that he cannot be *rehabilitated* to the extent where he may be expected to become a satisfactory soldier."

6. Persons discharged from the Army by AR 615-368 or AR 615-369 will be reentered only on authorization by the Adjutant General.

It will be noted in each regulation that a medical officer will examine and report on the soldier's mental and physical condition. Where psychiatric considerations are involved, the medical officer will be a psychiatrist and where "*any doubt exists as to the existence of mental or physical disability,*" *the soldier will be examined by a board of medical officers.* This board may be convened under AR 40-590 and other authority as may be proper to the type of case, and its findings reported on WD AGO Form 8-118.

1. Whether or not psychiatric considerations are involved, it is believed that if a psychiatrist examines the patient, the report of the examination should be in certificate form and should contain those elements necessary for the psychiatrist's report.

2. The board report, although somewhat different in form from a certificate, contains the same elements. A timesaving effective policy is to convene a board on a patient if a lay person might feel that "doubt exists as to the existence of a mental or physical disability," e.g., on a patient referred from another station for the express purpose of making this determination prior to AR 615-368 or AR 615-369 proceedings.

It is necessary that the observations and findings outlined below be made to justify a conclusion that the soldier is (1) unfit or shows (2) inaptitude or (3) unsuitability for the service. These observations

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and findings as well as recommendations are the necessary elements of both certificates and boards.

1. AR 615-368—Unfitness. In support of the finding of the soldier's unfitness it must be stated that he (a) shows certain habits or traits of character which must be named with their manifestations, (b) possesses unclean habits, (c) is guilty of repeated petty offenses, (d) is a habitual shirker, or (e) was recommended for discharge by a board of medical examiners as outlined in par. 1a(1)(e), AR 615-368 because of "psychopathic (antisocial) personality" *(2)*, or because the board classified him as having "no disease," *and* his record revealed frequent disciplinary actions ..... and/*or* it is clearly evident that his complaints are unfounded and are made with the intent of avoiding service.

Other necessary findings are that: (a) he is *totally* unfit for further retention in the military service, (b) his rehabilitation is considered impossible because either repeated attempts to accomplish this have failed, or attempts at rehabilitation are impractical, for reasons which must be stated, (c) "the soldier was and is mentally responsible both to distinguish right from wrong and to adhere to the right" *(3)*, (d) "he cannot be rehabilitated to the extent where he may be expected to become a satisfactory soldier." *(3)*, and (e) "there are no disqualifying mental or physical defects sufficient to warrant discharge through medical channels." *(3)*.

2. AR 615-369—Inaptitude. A soldier will be discharged for inaptitude only when it is determined that he "does not possess the required degree of adaptability necessary for military service after reasonable attempts have been made to reclassify and reexamine him in keeping with his abilities and qualifications." In support of such a finding it must be stated that he (a) lacks the required degree of adaptability for military service, (b) lacks general fitness, (c) lacks readiness or skill, (d) is extremely unhandy or (e) is inapt in some other specific way. Within the present meaning of the regulation, inaptitude is hardly a psychiatric determination, but is rather a conclusion reached by the soldier's unit commander, based on observation of his performance. Inaptitude should come into psychiatric consideration only in the event that such a conclusion has been reached and the medical officer is asked to determine whether or not there is a psychiatric basis for the already demonstrated inaptitude.

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(2) This provision is particularly applicable to (1) soldiers who are patients on a psychiatric service so that an expert determination can be made as to whether or not "attempts at rehabilitation are impracticable" and (2) those who although attempts at psychiatric rehabilitation can be made, no other attempts, e. g., environmental, are practicable within the hospital setting.

(3) Use these words.

3. AR 615-369—Unsuitability. In support of this finding it must be stated that the soldier (a) lacks physical stamina *(4)*; (b) presents such character and behavior disorders as a schizoid, paranoid, cyclothymic, inadequate or asocial *personality*; or emotional instability, dependency, or aggressive *immaturity reactions*; (c) has a mental deficiency; (d) shows apathy, defective attitudes, and inability to expend effort; (e) has acute reactions to special stress associated with one of the personality types mentioned in (b), (c), or (d); and (f) has an immaturity reaction with enuresis or other symptomatic habit formation.

Other necessary findings are that: (a) he is unsuitable for further military service, (b) he cannot be developed to the extent where he may be expected to absorb military training and/or become a satisfactory soldier, (c) "the soldier was and is mentally responsible, both to distinguish right from wrong and to adhere to the right," *(3)* and (d) "there are no disqualifying mental or physical defects sufficient to warrant discharge through medical channels." *(3)*

In certain persons there is a combination of mental or physical disability and unfitness, inaptitude, or unsuitability. Such combined cases are disposed of by first determining whether or not the soldier is unfitted for military service by reason of physical or mental disability. If he is so unsuited, he is presented to the AR 600-450 board with a view to referral to the Physical Evaluation Board. The AR 600-450 board makes a specific finding that although the unfitness, inaptitude or unsuitability exists, the presenting cause for inability to perform duty is the medical disability. If there is no medical disability, but the soldier is rendered noneffective by reason of unfitness, inaptitude, or unsuitability, he will be referred to a board of officers convened under the proper regulation with a view to administrative discharge. Persons who are unfit because of personality deviation, poor motivation, or unwillingness are separated for those causes notwithstanding the presence of a nondisabling medical or surgical condition when maximum benefit from hospitalization for such a condition has been attained.

AR 345-415, par. 9 authorizes the appointment of an investigating officer in every case of injury off the post, or when incurred under circumstances indicating willful misconduct, willful neglect, or gross negligence, or when the surgeon requests investigation. Battle casualties, directly caused by enemy action, are not investigated. A certificate by the medical officer is required and must show: (1) the extent of the injuries, (2) an estimate of future possible partial or complete permanent disability, (3) a statement as to the patient's sobriety on first examination, (4) whether or not the patient was under influence of drugs, and (5) the "sanity findings" with particular regard

(4) This applies to the group unlikely to render effective service if returned to duty, but who can be returned to civil life without recurrence of symptoms. The neuroses of these soldiers would very likely recur on return to duty, but should not recur if they are returned to their families.

to the injury or suicidal attempt in all cases of attempted suicide and in all other cases where mental competency is in question.

AR 605-200 provides for the elimination and demotion of officers. This regulation for officers is comparable to AR 615-368 and AR 615-369 for enlisted personnel. Depending on degree, demotion, elimination, or separation is indicated when an officer shows a decrease in efficiency, prolonged mediocrity, lack of leadership, lack of technical proficiency, or failure to discharge his assignments. Elimination is indicated when an officer is personally financially delinquent, misrepresents facts in an official document, shows habitual intemperance, recurring misconduct, or *apathy, defective attitudes inability or unwillingness to expend effort, or other character and behavior disorders.* A recommendation that an officer be referred to a board of officers convened under AR 605-200 may be made by a medical board or by certificate. The concepts set forth in discussing persons with a combination of mental or physical disability and unfitness, inaptitude or unsuitability are applicable. Although the procedure is not covered in any regulation, officers who are noneffective to a mild degree because of "unfitness, inadaptability or unsuitability" may present a request to a medical board for unqualified resignation of commission. The medical board may make a finding indicating cognizance of this request, and may further find that its acceptance would be to the best interests of the government and may recommend its acceptance. AR 605-275 permits an officer to submit his resignation at any time, and also permits wide discretion by the Army in acceptance of such a resignation.

About The Army Medical Service

AN OPEN MEMORANDUM FOR MAJOR GENERAL BLISS

Paul I. Robinson, *Brigadier General, MC, U. S. A. (1)*

IN JULY of 1947 you circulated to your staff several scripts which you had written and entitled "Thoughts on the Overall Aims of the Current Medical Administration." It was your expressed thought that these ideas could be used as objectives. You desired us to make frequent reference to them as time progressed and developments occurred. Your three main themes were (1) quality performance, (2) coordination, and (3) total medicine. Many of the objectives had to do with personnel activities. The purpose of this memorandum is to record the accomplishments pertaining to these objectives.

PROCUREMENT OF PERSONNEL

With regard to procurement of personnel you warned: "Don't lower criteria for admission to Regular Army in spite of present shortage. * * * It has been recognized for several years that the key post-war problem of the Medical Department would be the securing of an adequate number of competent doctors. * * * Detailed planning should be started on how the gap could best be closed between requirements and availabilities."

Some mistakes have undoubtedly been made, but of 1,908 applicants for the Regular Medical Corps since 1 July 1947, 436 have been rejected for one reason or another, Complete information has been sought on each application and each case has been presented in detail to the Central Medical Department Board for adjudication. Of 401 applicants for the grades of Major and above, 92 were rejected. A like proportion of junior applicants (344 out of 1,507) were not accepted. We had vacancies in all grades and it was therefore possible to adjudge every case on its merits. The fact remains that we did procure for the Regular Army Medical Corps 1,472 officers in the past 4 years and the net gain, subtracting losses from retirement, resignation, transfer, and

(1) Chief, Personnel Division, Office of the Surgeon General, Department of the Army.

death has been 918. The number of physicians commissioned in the Regular Army in these 4 years is equal to that of any previous period of 30 years.

In the fall of 1947 it became clear that one idea pervaded the thoughts of every young medical graduate—his desire to pursue residency training in a specialty. The Training Division had been laboring for months to establish acceptable residency training programs in certain of our hospitals. Approvals and partial approvals were beginning to be received, but the training positions were occupied, and rightfully so, by our officers who were in the Corps before World War II and who had been diverted from clinical medicine for 4 or more years. Our clinical work at that time was largely being accomplished by Army Student Training Program (ASTP) participants who had graduated prior to June 1946 and who, by law, were required to serve for 2 years. The last group of these was on duty, and with their separation from the service within the succeeding 18 months, there was no source of replacements in sight. In those gloomy days the Personnel Division spent many hours attempting to correlate residency and internship training with procurement. The time-honored Army internships had again been started but the number of interns obtained in the first 2 years was too small to be used as a procurement device to meet the problem ahead. It was known that a first lieutenant's pay for internship was attractive to many young graduates, because the majority of civilian institutions paid their interns little or nothing. This same factor applied to residencies, but the Army did not yet have sufficient approved residencies. The idea was finally evolved to combine commissions in the Regular Army with residencies and internships in civil life. The exploration and development of this idea is alone a subject for an entire report, but suffice it here to say that the following program was adopted and approved by Army authorities:

"Nine-point Procurement Program

"1. Commissioning 200 to 300 doctors per year in 1948 and 1949, who are in residency programs in civilian hospitals, allowing them to remain in their civilian residencies, even allowing them to compete for another year of formal training in civilian hospitals, but on active duty status.

"2. Commissioning 200 to 300 interns per year in 1948 and 1949 in civilian hospitals in Medical Corps Reserve, allowing them to finish internship on active duty status and compete for and accept residencies in civilian hospitals or Army hospitals, provided they come into the Regular Army.

"3. Obtaining 130 residencies in civilian hospitals throughout the United States and having them reserved for Army use.

"4. Procuring 400 to 500 officers per year in 1948 and 1949 from civilian, ASTP and Army intern sources, allowing them to compete for the 130 Army and 130 civilian residencies.

"5. Requiring every doctor to agree to serve as a duty officer in the United States Army one year for each year of formal postgraduate training, whether in a civilian or Army institution.

"6. Endeavoring to procure 100 to 300 mature, well-trained doctors directly into the higher grades (major, lieutenant colonel, and colonel).

"7. Expanding the Army postgraduate teaching program as rapidly as possible, both in the United States and overseas, so the Medical Department will not have to depend on civilian institutions for anything except exceptional training.

"8. Improving medical service in the Army so everyone will like it. This involves quarters, human understanding, social events, excellent medical care and all of the things which were part of pre-war Army service and which were inherently so attractive.

"9. Advertising continuously for doctors to do one or two years of duty for specific jobs. We are now advertising 143 positions in the European Theater and are publicizing specific jobs in the United States. Most such assignments would be as Reserve Officers on active duty."

It is interesting to note the success which was obtained in pursuance of each of the 9 points of the program. In 1948, 194 and in 1949, 139 civilian residents were commissioned. In 1948, 233 and in 1949, 296 civilian interns were placed in the program. Except for the residencies obtained for Professors of Military Science and Tactics and for such specialties as children's orthopedics, neurosurgery, and plastic surgery, the third point of the program never materialized. The positions obtained did account for 60 to 70 positions each year and cannot be considered a total loss. Furthermore, point 4 of the program broke down to some extent but was compensated for by the rapid approval of Army residency programs (point 7) so that 248 residents were accepted in 1948, 252 in 1949, and 202 in 1950. Point 5 of the program was accepted and later became a Defense Department policy. Under point 6 of the program, 309 officers in field grades were commissioned, completely fulfilling the objective. Certain directives giving quarters and concurrent travel priorities for medical officers were effective until after the advent of hostilities in Korea. Point 9 of the program was not greatly successful, in that only 15 or 20 physicians could be interested in long-term service.

Contributing to the number of duty personnel was the Defense Secretary's Moral Suasion program of 1949, which netted about 190 physicians. The advent of the conflict in Korea in the summer of 1950 brought definite realization to all in the Department of Defense and in the profession at large that a great expansion of forces could not be met by any measures short of Selective Service procedures. The 81st Congress passed Public Law 779 and, under its stimulus, requirements for physicians, dentists, and veterinarians have so far been met voluntarily.

TRAINING

With respect to training officers of the Medical Corps, you said: that (1) in the last war we made a serious error in trying to turn all Regulars into administrative officers; (2) The Army Medical Department could not perform its peacetime mission effectively nor prepare for war effectively without sending many officers to civilian institutions for postgraduate studies; (3) officers should be carefully selected for Army residencies and civilian training on a competitive basis; (4) all of our administrative medical officers would have to keep up professionally and many of them, particularly those who were heading for appointments as Army Surgeons and allied positions, should be particularly trained in preventive medicine and psychiatry; (5) hospital executives and perhaps other administrative medical officers should have the advantage of civilian training; and (6) the entire atomic warfare problem must be studied.

To avoid the errors you so succinctly pointed out, it was necessary to establish a planned career for the professional group, the command and staff group, and the preventive medicine group in the Medical Corps. Ledgers showing the progress of officers in these groups were necessary in order that intelligent assignment and control could be maintained. In addition, each officer was entitled to know just where he stood in the program. A comprehensive career planning system was devised and placed into operation *(2)*.

Career planning to be effective must extend to assignment in the most remote locations. This has been and is being accomplished by directive, by personal and official correspondence, and by listing of military and medical proficiency which is identified by MOS numbers in published orders when a change of station becomes necessary. Measurement of the efficiency of the system is difficult. Besides inspections which are frequently made by members of the Personnel Division and others, two major efforts of adjudication have been attempted. In 1948 the Inspector General was asked to make a world-wide survey to determine malassignments of medical officers. The report of this investigation was most encouraging, in that few bad assignments were located. In an opinion sheet which has been applied experimentally to those Medical Corps and Medical Service Corps officers who have returned to the United States from the Far East since 1 January 1951, very few officers have considered themselves to have been other than fully utilized in the fields of their major training. If carried through, this opinion sheet should afford valuable information for further advances in the utilization field although there can even now be no question that the system in practice is effective. Reserve officers being ordered to active duty will be classified and utilized within the operations of the career management system.

(2) Fielding, F. J.: About the Army Medical Service: Medical Corps officer classification. U. S. Armed Forces M. J. 1: 1081-1083, Sept. 1950.

Officers have continuously been made available for courses in civilian institutions in the fields of public health, personnel, atomic physics, and hospital administration. Since July 1947, 72 medical officers have completed full courses in these subjects. Thirty more have completed courses in the higher service schools (Command and General Staff College, Army War College, Armed Forces Staff College, Industrial College of the Armed Forces, and National War College). Beginning in the fall of 1950 students were selected for the basic and advanced courses in the Medical Field Service School, but this project had to be abandoned because of the Korean conflict. Selections have again been made for the fall of 1951. In the past 4 years 953 medical officers attended the 1-week course in the medical aspects of atomic warfare. About 50 medical officers were sent to the Army's Basic Science Course at the Army Medical Center and 20 are soon to complete the military medical phase of the basic medical course. Hundreds of young physicians each month are completing a special 1-month indoctrination course at the Medical Field Service School. Officers are being made availabe to participate in numerous short professional courses, both in and out of the Army.

Making officers available for training has been an important personnel function during these years, and a reasonable success is reported. The only critical area is that of the basic and advanced courses in the Medical Field Service School and this, although deterred by the Korean conflict, appears now to be well under way. Selection of residents for the professional programs is still being accomplished in the orthodox manner, using the judgment of representatives of the Personnel, Training, and Consultants Divisions of the Surgeon General's Office as well as representatives of the teaching hospitals. A special research project on this subject was initiated 1 July 1949 by the Personnel Division, and the third semiannual report on the project indicates that scientific methods of selection of residents may be more than a possibility. This work uses in part, the vocational interest approach and will be pursued further. This project is being undertaken at Stanford University under Army contract.

CONSULTANTS

In discussing civilian consultants, you stated: "The formal development of a system of consultants * * * is long overdue. We must establish as soon as possible a part-time civilian consultant system which will be charged with regular visits to and assessments of the professional work performed in our Army installations."

The civilian consultant system was developed to cover not only the specialized treatment and teaching centers, but also the Army Area Medical Service and overseas commands. Too much cannot be said in praise of the interest of the Society of Medical Consultants of World War II in the establishment and operational assistance in this program. There are 1,380 names on the list of consultants to the Surgeon Gen-

eral. In fiscal year 1951, 9,303 man-days of service will have been rendered to teaching hospitals, 1,906 to overseas commands, and 6,639 to other medical installations in the United States, a total of 17,848. This program would have been past its peak, had it not been for Army expansion, because of the fact that qualified officers from the various training programs are rapidly being made available to Army stations everywhere and the need for consultant service has been proportionately reduced. The number of board-certified specialists in the Medical Corps has reaced 232.

COORDINATION

Your statement: "Our entire Regular Army Medical Corps must be indoctrinated to a more liberal and far sighted policy on all issues affecting coordination" sums up the coordination objective of our general aims. Coordination on matters of personnel have been extended widely to all federal services, the Department of the Army General Staff, the Office of the Secretary of Defense, the Navy, Air Force, Selective Service System, and the National Security Resources Board. Coordination on personnel matters has extended to the American Medical Association, the Association of American Medical Colleges, and state, county, and city medical societies. Local committees and societies of physicians who are veterans also have great interest in current personnel affairs of the Army Medical Service. Army Reserve groups throughout the nation are being considered in our coordination efforts. It is doubted that coordination of personnel matters has ever been so widely conducted. This same statement can be made of the Dental, Veterinary, Nurse, and other professional Corps of the Army Medical Service with their representative associations and societies.

SUMMARY

This report is submitted in the sincere belief that (1) procurement of personnel for the Regular Army Medical Service during your administration can be said to be better than could have been foreseen; (2) the career planning system which has been developed has proved its value in selection for training, utilization, and performance; (3) in spite of shortages, the officers in the various Corps probably have reached a peak in professional proficiency never before equaled in the history of the Army Medical Service; (4) military medical training must continue to be emphasized so that younger officers may replace the older in the command and staff career fields; and (5) coordination of medical personnel matters has reached into almost every medical community.

The Army Medical Service is thus well on its way to greater success in its goal of total medicine. With this knowledge, those in the various Corps of the Army Medical Service are looking forward to their careers with confidence. There would appear to be no better way to end this report than in your own words:

"The efficiency of the Army is directly a result of the thinking of the people in it."

BOOKS RECEIVED

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The Diagnosis and Treatment of Adrenal Insufficiency, by *George W. Thorn*, M. D., M. A. (Hon.), LL. D. (Hon.), Hersey Professor of the Theory and Practice of Physic, Harvard Medical School; and Physician-in-Chief, Peter Bent Brigham Hospital, Boston, Mass.; with the collaboration of *Peter H. Forsham*, M. D., M. A., (Cantab.), Instructor in Medicine, Harvard Medical School and Junior Associate in Medicine, Peter Bent Brigham Hospital, Boston, Mass., and *Kendall Emerson, Jr.*, M. D., Assistant Professor, Harvard Medical School and Senior Associate in Medicine, Peter Bent Brigham Hospital, Boston, Mass. Publication Number 29; American Lecture Series. A Monograph in American Lectures in Endocrinology. 2d edition. 182 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill,, 1951. Price $5.50

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The 1950 Year Book of Dermatology and Syphilology, (December, 1949-November, 1950), edited by *Marion B. Sulzberger*, M. D., Professor and Chairman, Department of Dermatology and Syphilology, New York University Post-Graduate Medical School; Director of Dermatology and Syphilology, Skin and Cancer Unit and University Hospital, New York University-Bellevue Medical Center, and *Rudolf L. Baer*, M. D., Associate Professor of Clinical Dermatology and Syphilology, New York University Post-Graduate Medical School; Associate Director, Skin and Cancer Unit, and Attending Dermatologist, New York University Hospital. 497 pages; illustrated. The Year Book Publishers, Chicago, Ill., publishers, 1951. Price $5.

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Immunology, by *Noble Pierce Sherwood,* Ph. D., M. D., F. A. C. P., Professor of Bacteriology, University of Kansas, and Pathologist to the Lawrence Memorial Hospital, Lawrence, Kans. 3d edition. 791 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publishers, 1951. Price $8.

Handbook of Pediatric Medical Emergencies, by *Adolph G. DeSanctis,* M. D., Professor of Pediatrics and Chairman of the Department of Pediatrics, Post-Graduate Medical School, New York University-Bellevue Medical Center; Director of Pediatrics, University Hospital, New York University-Bellevue Medical Center; Director of Pediatrics, Gouverneur Hospital, New York City, and *Charles Varga,* M. D., Instructor in Pediatrics, Post-Graduate Medical School, New York University-Bellevue Medical Center; Assistant Attending Pediatrician, University Hospital, New York University-Bellevue Medical Center; Assistant Visiting Pediatrician, Gouverneur Hospital, New York City. 284 pages; with 51 illustrations. The C. V. Mosby Co., St. Louis, Mo., publishers, 1951. Price $5.

Yellow Fever, by *George K. Strode,* M. D., Editor, and *John C. Bugher,* M. D., *J. Austin Kerr,* M. D., *Hugh H. Smith,* M. D., *Kenneth C. Smithburn,* M. D., *Richard M. Taylor,* M. D., *Max Theiler,* M. R. C. S., L. R. C. P., *Andrew J. Warren,* M. D., and *Loring Whitman,* M. D. 710 pages; illustrated. McGraw-Hill Book Co., Inc., New York, N. Y., publishers, 1951. Price $9.50.

A Textbook of X-ray Diagnosis, by British Authors, in Four Volumes. Volume I. Edited by *S. Cochrane Shanks,* M. D., F. R. C. P., F. F. R., Director, X-ray Diagnostic Department, University College Hospital, London; and *Peter Kerley,* M. D., F. R. C. P., F. F. R., D. M. R. E., Director, X-ray Department, Westminster Hospital; Radiologist, Royal Chest Hospital, London. 2d edition. 434 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951. Price $12.

BOOK REVIEWS

1950 Year Book of Dentistry (August 1949-August 1950), edited by *Stanley D. Tylman,* D. D. S., M. S., Professor and Head of the Department of Prosthetics, University of Illinois College of Dentistry, Chicago, Ill., *Donald A. Keys,* D. D. S., Professor and Chairman of the Department of Operative Dentistry, College of Dentistry, University of Nebraska, Lincoln, Nebr., *John W. Knutson,* D. D. S., Dr. P. H., Dental Director, Chief of the Division of Dental Public Health, Public Health Service, Washington, D. C., *George R. Moore,* D. D. S., M. S., Professor and Head of the Department of Orthodontics, School of Dentistry, University of Michigan, Ann Arbor, Mich., *Hamilton G. B. Robinson,* D. D. S., Director, Post-Graduate Division, College of Dentistry, Ohio State University, Columbus, Ohio, and *Carl W. Waldron,* M. D., D. D. S., Clinical Professor of Oral Surgery, University of Minnesota, School of Dentistry, Minneapolis, Minn. 525 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1950. Price $5.

This series of abstracts, by a group of men prominent in their respective fields, covers articles published in medical and dental journals in this country and abroad between August 1949 and August 1950. The book brings us an impressive array of significant developments in the theoretical and practical phases of the art and science of dentistry. The articles are grouped in the following divisions: (1) diagnosis; (2) dentistry for children; (3) pulpal and periodontal diseases and pathology; (4) caries; (5) public health; (6) orthodontics; (7) surgery and related pathology; and (8) restorative and prosthetic dentistry. Some of the most significant recent developments described are the uses of aureomycin in dentistry and its proved effectiveness in patients with actinomycosis of the jaw, painful mouth ulcerations, herpetic gingivostomatitis, and osteomyelitic bone conditions. In the field of public health the use of fluorine as a topical agent in both children and adults and fluorine in the water supply in proper quantity has been justified beyond question. One must read this work to appreciate the quantity and quality of current research in dentistry. The volume is of value to the busy practitioner because it enables him to keep abreast of these developments and to apply the best technics in his practice. The source of each abstract is given in a footnote for those who wish to read the original article.—*Capt. M. Dicker, U. S. A. F. (DC)*

Physiology of Shock, by *Carl J. Wiggers,* M. D., Sc. D., F. A. C. P., Professor of Physiology and Director, Department of Physiology, School of Medicine, Western Reserve University. 458 pages; illustrated. The Commonwealth Fund, New York, N. Y., publisher, 1950. Price $5.

This monograph has evolved from investigations which began over 40 years ago. During the past decade in his department at the School of Medicine of Western Reserve University the author has directed research on the peripheral circulation and shock. No one is better qualified to review the accumulated experimental and clinical data on this subject. The book is written primarily for those interested in the physiologic investigation of shock. The criteria of experimental shock, methods of producing experimental shock, and newer

methods for studying the hemodynamics of shock are discussed in detail. The concept of oligemic and normovolemic shock is defined, and an experimental procedure has been devised which permits comparison of sequential events of oligemic and normovolemic shock in the same animal, thereby facilitating the evaluation of the changes in blood volume and the default of cardiovascular mechanisms. These basic hemodynamic changes are ably illustrated by several charts which summarize the relative roles of the hydraulic and vascular factors.

The mechanisms of peripheral circulatory failure are considered under the subheadings of generalized changes in capillary permeability, sequestration and pooling of blood, capillary trapping, venopressor mechanisms, and the changes in arterial pressure pulses. The role of myocardial insufficiency or depression in most cases of shock is studied by means of stroke volumes at equivalent venous pressures, the intraventricular pressure changes and electrocardiographic criteria. Because shock caused by loss of blood or plasma includes more than a disparity between blood volume and the vascular capacity, the author considers the oxidative and respiratory functions in shock, including oxygen consumption and transport, acidosis, tissue metabolism and enzyme systems, carbohydrate and protein metabolism, and then ties all factors together in a discussion of therapeutic implications.

In the last two chapters he evaluates the toxemic and neurogenic factors that may play subsidiary or predominant roles in the development of shock, and discusses the involvement of the adrenals, liver, alimentary tract, and kidneys. Although the average clinician is likely to find this excellent book complex and tedious, all medical officers should read the chapter on clinical shock, the sections on therapeutic implications, the summary of sequential reactions in the development of shock, and the outline of challenging unsolved problems.

—*Maj. J. C. Shrader, U. S. A. F. (MC)*

Movable-Removable Bridgework, A System of Physiologic Bridge Work Devised by Herman E. S. Chayes, D. D. S., by *John Oppie McCall,* D. D. S., F. A. C. D., F. A. A. P., Former Instructor of Periodontia, University of Buffalo; Former Instructor in Periodontia, Extension Courses, Columbia University; Former Professor of Periodontia, New York University; Former Director, the Murry and Leonie Guggenheim Dental Clinic, New York; Past President, American Academy Dental Clinic, New York; Past President, American Academy of Periodontology, and *Isadore M. Hugel,* D. D. S., Associate in practice and teaching with the late Herman E. S. Chayes; Former Instructor in Crown and Bridgework, New York University; Assistant Clinical Professor of Oral Surgery, New York University; Diplomate of the New York State Board of Oral Surgery; Member Omicron Kappa Upsilon; Member American Association of University Professors, with a chapter on The Physiologic Movement of Teeth by *Charles F. Bodecker,* D. D. S., F. A. C. D., Emeritus Professor of Dentistry (Histology), Columbia University College of Dental and Oral Surgery; Noted Researcher and Authority in Dental Histology. 221 pages; illustrated. Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y., 1950. Price $7.50.

McCall states that this book was prepared to preserve a record of Herman E. S. Chayes and to present in compact and readily accessible form the system of movable-removable bridgework which he developed and advocated. A very direct and frank preface establishes the qualifications and interest of the authors in writing the book. The senior author sees the virtues of the Chayes system of bridgework through the eyes of the periodontist, while the junior author endorses the system on the basis of years of its successful use. Part I is largely introductory and biographical. It sketches the early life of Chayes and highlights his professional career. A summary of the principles of the movable-removable bridge is included with arguments gathered from the literature for and against fixed bridgework. An appendix to Part I contains a short

paper by Bodecker entitled "The Physiological Movement of Teeth." In Part II McCall presents the most important writings of Chayes. These show a progression in the development of the movable-removable bridge from the early days when this method of treatment met with bitter opposition to the time when it was perfected and became widely accepted. Part III by Hugel opens with excellent chapters devoted to oral examination and case evaluation prior to restoration. The various steps in construction and repair of movable-removable bridgework are then explained. The authors are to be commended for the capable manner in which their material was prepared and presented. Minor printing errors appear in Part I.—*Capt. A. R. Frechette, D. C. U. S. N.*

Illustrations of Bandaging and First-Aid, Compiled by *Lois Oakes*, S. R. N., D. N. (Leeds and London), Formerly Nursing Editor, Nursing Illustrated; Late Sister-Tutor, Walton Hospital, Liverpool; Nursing Technical Officer to Ministry of Labour, Eastern Region, Examiner to the General Nursing Council. 4th edition. 307 pages; illustrated with 370 photographs. The Williams and Wilkins Co., Baltimore, Md., publisher, 1950. Price $2.

Many excellent photographs of bandaging and the technics used in first aid are presented in this book. These help the student to master quickly the science and art of bandaging. The section on war wounds has been replaced by a new section dealing with elastoplast and its application. This textbook is highly recommended for instructors, and also for students taking a course in first aid.—*Lt. E. Pullekinus, NC, U. S. N.*

"Your Prostate Gland," Letters from a Surgeon to His Father, by *Reed M. Nesbit*, M. D., Professor of Surgery, University of Michigan Medical School, Chief, Section on Urology, University Hospital, Ann Arbor, Mich. 50 pages; illustrations by *Janet McLaughlin*. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.

To discuss a subject simply one must be thoroughly familiar with the material. The converse is not always true. Happily, Dr. Nesbit has both attributes. This book is an unedited series of letters from the author to his father who requested information on this aspect of urology, and it covers the basic anatomy and physiology of the prostate, the way in which prostatic obstruction occurs, the symptoms resulting from the enlargement, a few of the sequelas associated with untreated cases, nonsurgical and surgical methods of treatment and the problems and prognosis pertinent to cancer of the prostate. The author warns the readers that this book is not to be used "as a yardstick for self diagnosis." The tone of the letters is informal. Well-chosen similes are used. Historical landmarks of medical progress in this field are brought into focus. The author, using the thesis that what one understands is rarely feared, contributes most when he presents a detailed discussion of the four surgical methods of removing the prostate. It is recommended reading for patients contemplating prostatectomy and urologists who wish to describe in clearer language what is in store for their patients.—*Lt. P. L. Bates, MC, U. S. N.*

Physical Diagnosis, by *Ralph H. Major*, M. D., Professor of Medicine, The University of Kansas. 4th edition. 446 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951. Price $6.50.

This concise and readable text represents 15 years of experience in the teaching of physical diagnosis. The author has avoided such extraneous material as x-ray, electrocardiography, and other laboratory procedures. The illustrations are excellent. Much of the subject material and many of the illustrations are obtained from such authorities as Cabot, Rose and Elmer, Emerson, Norris and Landis, Pratt and Bushnell, Seifert and Muller, Edens and Letulle, and others. This book is primarily a textbook for medical students and not an encyclopedia on physical diagnosis.

—*Col. J. T. B. Strode, MC, U. S. A.*

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The Normal Encephalogram, by *Leo M. Davidoff*, M. D., Director of Neurological Surgery, Beth Israel Hospital, New York City; Clinical Professor of Neurosurgery, New York University Postgraduate Medical School, and *Cornelius G. Dyke*, M. D., Late Associate Professor of Radiology in the College of Physicians and Surgeons, Columbia University; Late Director, in the Department of Radiology of the Neurological Institute of New York, New York City. 3d edition, thoroughly revised by *Leo M. Davidoff*, M. D. 240 pages; 190 illustrations on 156 figures. Lea & Febiger, Philadelphia, Pa., publisher, 1951. Price $6.

The companion volume, "The Abnormal Encephalogram," planned by these authors, was delayed by the death of Dr. Dyke, a pioneer in the field and was recently published under the authorship of Davidoff and Epstein. The present edition of "The Normal Encephalogram" does not basically alter the highly satisfactory text of the previous editions. It brings the literature up to date, and embodies a number of minor changes in texts and illustrations. Together with its companion volume, this book should be consulted by all medical officers concerned in neurologic diagnosis.

—*Lt. Col. S. W. Ranson, MC, U. S. A.*

An Illustrated Study Aid for Medical Bacteriology, by *Walter J. Nungester*, Sc. D., M. D., and *Phebe G. Williams*, B. A., Department of Bacteriology, University of Mich. 92 pages; illustrated. Distributed by Ulrich's Ann Arbor, Mich., 1950. Price $2.50.

As stated in the preface, "This is not a book with permanent value, but rather an inexpensive manual which we hope may be of value in supplementing the more formal presentations of text books and lectures." This manual contains many diagrams and drawings that would be valuable as teaching aids. Such subjects as the transmission of disease, sterilization, and immunity are graphically presented in such a simple fashion as to be easily understood by a student with a meager background. The sections on infectious diseases, listed according to the systems or organs affected, are well tabulated as to the characteristics of the causative organisms, laboratory diagnosis, treatment, and epidemiology. What text there is, is in outline form, which does not lend itself to ease in reading or reference. Although some of the material has been over-simplified to the extent that it is of little value for teacher or student, many diagrams and sketches illustrating technics that are difficult to describe such as venipuncture, chick embryo and yolk sack inoculations, could well be reproduced as lantern slides or wall charts. The authors may have attempted to cover too wide a field. Subjects ordinarily outside the scope of the usual course in medical bacteriology have received equal treatment. Protozoa, blood groupings, and serologic reactions which were included could have been left to manuals in those fields.—*Lt. Comdr. T. M. Floyd, MSC, U. S. N.*

Recent Advances in Nutrition, with Particular Reference to Protein Metabolism, by *Paul R. Cannon*, Ph. D., M. D., Chairman of the Department of Pathology, University of Chicago; in collaboration with *Earl P. Benditt*, M. D., *Laurence E. Frazier*, M. A., *Eleanor M. Humphreys*, M. D., *Harold C. Steffee*, M. D., Ph. D., *Robert W. Wissler*, M. D., Ph. D., *Robert Woolridge*, M. A. Porter Lectures, Series 14. 74 pages; illustrated. University of Kansas Press, Lawrence, Kans., publisher, 1950. Price $2.

This excellent treatise on protein nutrition for the internist, dietitian, nutritionist, and student contains three lectures given to the faculty and students of the University of Kansas. The wasteful habit of processing food for the American market and the lack of food conservation in the home are stressed. A detailed discussion of the amino acids and protein metabolism is given. In view of the fact that carbohydrates, fat, vitamins, and minerals are not discussed, the title is misleading.—*Col. F. W. Pruitt, MC, U. S. A.*

Pars Pro Toto, Abbreviations in International Medical Literature Including Sister Sciences In Six Languages, by *Alfred Peyser.* 196 pages. Almqvist & Wiksell, Stockholm, Sweden, publisher, 1950. Price 12 kr. (about $2.33).

This book fills a growing need resulting from the inevitable increase in the prevalence of initials and other abbreviations in medical literature. In it are listed in alphabetic order common English, French, German, Danish, Swedish, Italian, Spanish, Latin, and international abbreviations with their meanings. When appropriate the abbreviations are also identified with one or more special fields such as chemistry, dentistry, military medicine, et cetera. One of the chief values of the book is that it brings together under one cover material that would otherwise have to be sought (not always with success) in many volumes. It appears to be very complete except for the omission of terms specifically related to veterinary medicine.—*Col. W. G. Brandstadt, MC, U. S. A.*

A Classified Bibliography of Gerontology and Geriatrics, Prepared for Stanford University under a grant from The Forest Park Foundation, Peoria, Illinois, by *Nathan W. Shock,* Chief, Section on Gerontology, National Institutes of Health, and Baltimore City Hospitals. 599 pages. Stanford University Press, Stanford, Calif., publisher, 1951. Price $15.

In this bibliography are found references under alphabetically arranged subject headings from American and foreign journals. There is also a journal index and an author index. This volume places a tremendous amount of information in a ready, available form, and should be of outstanding value to those interested in gerontology.—*R. Adm. G. W. Calver, MC, U. S. N. (Ret.)*

The 1950 Year Book of Drug Therapy (October 1949 - September 1950), edited by *Harry Beckman,* M. D., Director, Department of Pharmacology, Marquette University School of Medicine. 566 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $5.

With the continued rapid advances in therapeutics most practitioners will have frequent occasion to refer to this type of book. The editor, an acknowledged authority on therapeutics, has followed the usual Year Book pattern of conveniently grouped abstracts. Of necessity, such a volume can be neither comprehensive nor authoritative, and yet the topics are exceptionally well-covered within the limits imposed by the format. Pungent editorial comments highlight many of the abstracts. It is highly recommended to all practitioners of medicine.—*Lieut. R. K. Moxon, MC, U. S. N.*

Diseases of the Tropics, by *George Cheever Shattuck,* M. D., Professor of Tropical Medicine, Harvard Medical School and Harvard School of Public Health, Emeritus; Consultant for Tropical Diseases, Boston City Hospital, and Massachusetts General Hospital. 803 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., publishers, 1951. Price $10.

Although the style of this book is terse, and at times almost telegraphic, often reminiscent of the TB Med's issued by the War Department during World War II, which are referred to frequently, it has imparted a sense of haste in preparation, which I find undesirable in textbooks. Certain inconsistencies appear in the text. For example, a large part of the section on the treatment of cholera, published in TB Med 138, 1945 is quoted, including the statement "The clinical value of penicillin has not been determined." In the same chapter reference is made to the work of Reimann in China and the chapter closes with the statement "Penicillin seems to be without effect in cholera."

Some statements are not entirely justified. On page 218, in discussing the treatment of yaws the necessity for proper sterilization of syringes and needles is emphasized in the following statement: "Many of the cases of hepatitis

which followed antisyphilitic treatment were erroneously attributed in the past to arsphenamine." Such a statement places too little emphasis on the toxic properties of the arsenicals. On page 453, in discussing the treatment of psittacosis the author states: "Aureomycin is believed to be highly effective against the virus of psittacosis as well as against various other viruses. For example, Finland and others (1949) reported prompt improvement in a small series of cases of primary viral pneumonia. The virus was not identified." This seems a tenuous thread of proof for the effectiveness of a therapeutic agent. On page 279, the following statement is made: "Vaccines have not been available in quantity but they are now being made and tested (Plotz and others, 1946)." This is in reference to scrub typhus vaccine. In 1949 Berge, Gauld and Kitaoka, and in 1950 Smadel, Bailey and Diercks demonstrated the ineffectiveness of scrub typhus vaccine. The above statements serve as examples and do not represent all of the questionable passages by any means. The arrangement is haphazard with Part I being devoted to the tissue protozoa and Part VII to the intestinal protozoa, the rickettsial, bacterial, and viral diseases coming between. Furthermore Part III deals with rickettsial diseases, Part IV with bacterial diseases and Part V with viral diseases. The book is not entirely without merit, however. The bulk of the information is accurate and many readers will no doubt like the style. The illustrations are profuse and in general are good. The color plates on malarial parasites and on the blood and tissue flagellates are excellent.—*Col. R. P. Mason, MC, U. S. A.*

Functional Anatomy of the Limbs and Back, A Text for Students of Physical Therapy and Others Interested in the Locomotor Apparatus, by *W. Henry Hollinsbead*, A. B., M. S., Ph. D., Head of the Section on Anatomy, Mayo Clinic, Rochester; Professor of Anatomy, Mayo Foundation, University of Minnesota. 341 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951. Price $6.

This monograph has been prepared as a text for students interested in the locomotor apparatus. Although the author prepared it primarily for students of physiotherapy, its usefulness extends far beyond this particular group. It is so well organized that it will serve as an excellent reference source for the physician whose only connection with functional anatomy dates from his early medical school days. It will be particularly useful as a ready reference by orthopedic residents and interns, and useful in demonstrating disabilities to the patients themselves. The book is divided into five main sections, covering (1) the organization of the body, (2) the upper limb, (3) the lower limb, (4) the back, and (5) the head, neck, and trunk. Line drawings are used throughout to illustrate articulations of the body with their primary movers. The clarity of illustrations needs little explanation, but a concise text describes each part and its function. Terms have been defined and simplified and the basic features of each major position of each musculoskeletal system are clearly described. The author has succeeded in drawing together and presenting, in a logical order, facts and opinions which are usually widely scattered through various sections of the larger textbooks of anatomy and in original papers. This monograph is a definite contribution and should be available in all hospital libraries, as well as be on the book shelves of all students of bodily function.—*Commander C. R. Carr, MC, U. S. N.*

Anatomy of the Nervous System, by *Olof Larsell*, M. A., Ph. D., Sc. D., Professor of Anatomy, University of Oregon Medical School, Portland. Introduction by *A. T. Rasmussen*, Ph. D. 2d edition. 520 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., publishers, 1951. Price $9.

This textbook is written primarily for the medical student who is taking a course in neuro-anatomy. In an orderly, progressive manner, the author introduces the gross anatomy, embryology, and histology of this complicated system.

By the liberal use of good illustrations in close relation to the written text, the reader is enabled to assimilate the material more easily. A bibliography is appended at the end of each chapter. The author has purposely omitted illustrative cases and other clinical examples because these can be presented by the instructor in the classroom.—*Lt. (jg) R. T. Donelan, MC, U. S. N. R.*

Friend of the People, The Life of Dr. Peter Fayssoux of Charleston, South Caroline, by *Chalmers G. Davidson.* 151 pages. Published by The Medical Association of South Carolina, 1950. Price $2.75.

This is a biography of the first president of the Medical Association of South Carolina, who was notable also as a patriot and civic leader. Throughout the entire period of the American Revolution he served in charge of the general hospital for the Army in the southern colonies. After the war he was leader of the movement against the concentration of power in the hand of the Federal Government so has the distinction of being one of the first of the "States Righters." The author has furnished a short but excellent bibliography.

—*Capt. L. H. Roddis, MC, U. S. N. (Ret.)*

Trends in Gerontology, by *Nathan W. Shock,* Chief, Section on Gerontology, National Heart Institute, National Institutes of Health, and The Baltimore City Hospitals. 153 pages; illustrated. Stanford University Press, Stanford, Calif., publishers, 1951. Price $2.50.

More people are growing old. This constitutes a problem for the laboring man himself, his employer, and the union to which he belongs. When the answer is not harmoniously achieved, then the problem becomes one for the civil authorities as the worker becomes a public care and needs charitable and public support. The approach to this problem belongs in the field of gerontology and is discussed by the author from the various approaches from the trends in population change, through education, housing, employment, and maintenance in retirement. The book is well written, easily understood, and is a build-up for the establishment of a separate institute instead of a new section within the National Institute of Health.

I disagree completely with the premise that old people must be taken care of by their family or the community. Just as we train children to develop into adults, so must we train adults to be able to adjust themselves to the problem of self-support and keeping self-respect and independence in their later years. This should not be a responsibility of the Federal Government. If a person is to be worth while his self-respect and independence must be allowed to develop. These characteristics are rapidly being destroyed by our failure to stimulate a man to solve his own problems. The "well-doers" find their jobs increased by the greater number they can find to care for, and so it is good policy for them to create a feeling of dependency and need for support among their clientele. Many of these problems are well covered by the author, and for that reason alone "Trends in Gerontology" is worth reading.

The unions representing labor and the industrialists representing capital are already alert to this problem. If a man has a hobby before he reaches 40 he will be an expert in his hobby by the time he has reached retirement age. Countless people have found their hobbies have become a more lucrative and pleasant source of income than their usual occupation. Let's encourage people to be independent and have self-confidence, and their problems of aging will be easy. A person who is working will be more contented than one who could be occupied but doesn't know how. We can never escape our responsibility for the physically unfit and mentally unfortunate. That is a local and State problem, however. Every person must be encouraged to make a niche for himself in the world of today, and the problem for tomorrow will be solved. A worker must learn his responsibility to be worthy of his hire.

—*R. Adm. G. W. Calver, MC, U. S. N. (Ret.)*

The Use of Pedicle Flaps of Skin in Plastic Surgery of the Head and Neck, by *Gordon B. New,* M. D., F. A. C. S., Professor of Plastic Surgery, and *John B. Erich,* M. D., F. A. C. S., Associate Professor of Plastic Surgery; Both of Graduate School, University of Minnesota, Minneapolis, and Section on Laryngology, Oral and Plastic Surgery, Mayo Clinic, Rochester, Minn. Publication Number 56, American Lecture Series. 104 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $3.

The authors of this monograph have presented a concise description with excellent illustrations of the use of standard procedures in reconstructive operations on the head and neck. The first chapter defines the terms used and discusses the physiologic changes that occur in the transfer and the establishment of the new circulation in the transferred flap. Chapter 2 deals with the general use of flaps for the head and neck. The authors list the following indications for the use of flaps: (1) chronic inflammatory ulcerations that will not heal, (2) severely scarred areas and contractures, (3) exposed bone, (4) perforations, (5) a need of subcutaneous fat, and (6) reconstruction of organs, eyelids, nose, et cetera. In chapter 3 the planning and formation of the flaps, either simple or tubed, the method of outlining, and the means of transmissal, bridging, and basing are presented. The next two chapters take up single and double pedicle flaps respectively. Chapter 6 presents in outline form the flaps used by the authors with the advantages and disadvantages of each. Chapter 7 discusses the lining of flaps by (1) adjacent tissue, (2) folding in of the distal end of the flap, and (3) free grafts. Chapter 8 deals with elevation, delay, and transplantation of various forehead, scalp, and upper trunk pedicle flaps and tubes for correction of facial defects. The last chapter is devoted to flaps which are considered by the authors to be best-suited for covering head and neck defects of various sizes and from various causes.

The book presents a brief discussion of the use of flaps in reconstruction of the head and neck. The plan of the flap is well-described, the locations are standardized and the technic described. It should serve well as a reference for the planning of flaps of the head and neck.

—*Commander J. T. Gianninni, MC, U. S. N.*

James Lind, Founder of Nautical Medicine, by *Louis H. Roddis,* Captain, Medical Corps, U. S. Navy. 177 pages. Henry Schuman, Inc., New York, N. Y., publishers, 1950. Price $3.

James Lind's right to the title,"Founder of Nautical Medicine," is convincingly set forth in this very readable book, which presents a well documented appraisal of the 18th century British naval surgeon's accomplishments. The scope of his achievements in the control of disease and in naval hygiene and sanitation justify his place among the great men of medical history. The value of Dr. Lind's work was recognized in his own period, not only in England but on the continent, where his writings were published in four translations. Since his death, however, the importance of his work has been even more fully appreciated. He has been the subject of several biographic sketches during this century, but it has remained for the author of this book to demonstrate his full stature in the field of medical history.

Lind's pre-eminent accomplishment lay in demonstrating the efficacy of citrus fruit juice in the prevention and cure of scurvy. Scurvy is said to have caused more deaths among sailors than all other hazards of the sea, including the wars of 300 years. It was not uncommon for half the crew of a ship to die of scurvy on a single voyage. Yet within a year after Lind's experimentally proved remedy was adopted by the British Navy, scurvy had practically disappeared from the fleet. From its position as the most dreaded killer on the high seas, scurvy dropped almost over night to a disease of no consequence. This momentous advance in disease control was not without repercussions on the home front because of the resulting shortage of citrus fruit ashore. The

author quotes an exasperated lady who was unable to get oranges for her parties because "this physician can persuade Lord Howe (Admiral of the Fleet) to anything."

Lind's life and work are presented in a rich background of 18th century naval life. The composite picture of a naval surgeon in the reign of King George II, as drawn from contemporary writings, is described with the directness of an eye witness' account. The hardships of life at sea, which seem to have been rather casually accepted at the time, are made vivid through the judicious use of quotations from journals and letters of the period. This makes highly interesting and entertaining reading, with an appeal not limited to medical or naval personnel.—*Capt. R. L. Ware, MC, U. S. N.*

The Practice of Sanitation, by *Edward S. Hopkins*, Principal Associate Engineer, Bureau Water Supply, Baltimore, Md.; Lieutenant Colonel, Medical Service Corps (Sanitary Engineering Section) United States Army Reserve; Instructor, McCoy College, Johns Hopkins University; formerly Special Lecturer, Western Maryland College; and *Francis B. Elder*, Engineering Associate, American Public Health Association, Colonel, Medical Service Corps (Sanitary Engineering Section) United States Army Reserve. 423 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1951. Price $7.50.

In the foreword Professor Wolman points to the relationship between the will to live and the developments in environmental sanitation on this country. The authors have attempted to survey these developments briefly for the beginner in this field, and have done so with very few omissions. Starting out with fundamental concepts they proceed to a discussion of the principle of disinfection, the sanitary survey, food, milk, water, sewage, stream pollution, refuse disposal, ventilation, swimming pools, insect and rodent control, and administrative procedures. Into a separate chapter on environmental sanitation and the public health they have placed such miscellaneous items as air pollution, housing, noise abatement, industrial sanitation, public buildings, rail, water and air transportation, and camps of various sorts. References are placed at the end of every chapter. Some but not all chapters end with a summary or conclusions. The illustrations are well chosen. The author index is separate from the subject index.

In the discussion of the chlorination of water no mention is made of breakpoint chlorination as this was probably considered too technical a point for the group the book is expected to reach. It is unfortunate that in discussing rodenticides no mention is made of warfarin or of the new repellants. Despite these minor criticisms the book is admirably suited for the teacher, the general student, the nurse, sanitarian, layman, or health officer. I know of no other ready reference which brings so much current knowledge under one cover in such an easily readable style.—*Col. W. G. Brandstadt, MC, U. S. A.*

Toxicology of Uranium, Survey and Collected Papers, edited by *Albert Tannenbaum*, M. D., Director, Department of Cancer Research, Medical Research Institute, Michael Reese Hospital, Chicago; formerly Senior Chemist and Toxicologist, Cook County Coroner's Laboratory, Chicago. 333 pages; illustrated. McGraw-Hill Book Co., Inc., New York, N. Y., publishers, 1951. Price $3.

This volume in the Nuclear Energy Series summarizes the pharmacologic studies on injected and ingested uranium compounds. The investigations were carried out at the Metallurgical Laboratory (Manhattan Project) between 1942 and 1946. Part 1 gives a review and general discussion of uranium poisoning. Part 2 is a collection of 16 papers covering various aspects of the problem. The toxicity of uranium does not result from its radioactive properties but is caused mainly by its nephrotoxic action, similar to that of many other heavy metals. "Uranium appears to be less of a toxicological hazard than is mercury

or lead." Although the volume unfortunately does not present all the available literature on the toxicology of uranium since there are few references to recently declassified material and the latest open reference is dated 1948, it will undoubtedly become a standard reference on uranium. A study of details of the experimental procedure will provide many helpful hints as to the methods of attack on other toxicologic problems. The format, printing, references, and cross-indexing show a workmanlike job by the editor and publisher.

—*Commander H. C. Dudley, MSC, U. S. N.*

Nitrous Oxide-Oxygen Anesthesia, by *F. W. Clement*, M. D., Diplomate American Board of Anesthesiology; Fellow of the International College of Anesthetists; Fellow of the American College of Anesthetists; Member of the International Anesthetic Research Society; Member of the Ohio Society of Anesthetists; Chairman of the Section on Anesthesiology of the A. M. A., 1950; Past President of the Mid-Western Society of Anesthetists, 1932; Past President of the Associated Anesthetists of the U. S. and Canada, 1938; Formerly Director of Anesthesia at Flower Hospital; Mercy Hospital; The State Hospital for the Insane; Lucas County Hospital; and Toledo Dental Dispensary; Staff Anesthetist to Toledo and St. Vincent's Hospital; World War I—C. A. M. C. and R. A. M. C., 1914-1920; World War II—M. C., A. U. S., A. A. F., 1942-1945. 3d edition. 369 pages; 129 illustrations. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $6.50.

In this new edition the author has improved his presentation by rearranging his material. The book is well written and includes an adequate bibliography. Preoperative examination is emphasized; classification of anesthetic risks and premedication for children as well as adults are covered in detail. Dr. Clement reviews the cause, symptoms and treatment of shock with stress on early recognition and prevention. He describes a depression test under nitrous oxide and oxygen anesthesia to detect early shock. Endotracheal anesthesia and carbon dioxide absorption are discussed and the use of curare in anesthesia is advocated. There are many excellent illustrations of machines, equipment, and technics and a large section devoted to dental anesthesia. The author describes his technics in great detail with specific instructions although his use of the terms maximum and minimum oxygen are vague. Although he insists throughout that his nitrous oxide and oxygen anesthesia is not hypoxic and discussed cyanosis and hypoxia in relation to nitrous oxide and oxygen anesthesia, it is hard to believe that a restricted oxygen intake (100 percent nitrous oxide induction) does not lead to a lowered blood oxygen which is undesirable if maintained for any length of time even in the best risk. He also stresses the dangers of oxygen lack with other anesthetic agents. The short summaries given at the end of each chapter abound in pertinent maxims for the anesthetist.—*Commander D. J. Giorgio, MC, U. S. N.*

Chemistry Visualized and Applied, by *Armand Joseph Courchaine*, Instructor in Biological Chemistry, Hahnemann Medical College, and Science Instructor, Hahnemann Hospital School of Nursing, Philadelphia; formerly Laboratory Supervisor, Human Serum Albumin Department, Sharp & Dohme, Inc., Glenolden, and Chemical Analyst, Allied Chemical & Dye Corporation, Barrett Division, Philadelphia. Edited by *M. Cordelia Cowan*, with drawings by *Richard Albany*. 687 pages; illustrated. G. P. Putnam's Sons, New York, N. Y., publisher, 1950. Price $5.50.

This is a rather good attempt to compress the fundamentals of inorganic, organic, physical, and biologic chemistry into a single small volume. It includes recent developments in many specialties such as radioactive isotopes, steroid chemistry, et cetera. Designed for students with no previous training in chemistry, the material is limited to a simple introduction of terminology

and basic principles. The author has, however, skillfully avoided much of the confusion and many of the errors that usually attend over-simplification. The material is so condensed that much supplementary lecture and classroom discussion would be necessary to give the beginner a reasonably clear picture of the scope and limitations of the many topics included.

—*Lt. Col. M. E. Freeman, MSC, U. S. A.*

The External Secretion of the Pancreas, by *J. Earl Thomas,* M. D., Professor of Physiology, Jefferson Medical College of Philadelphia, Philadelphia, Pa. Publication Number 45, American Lecture Series. 149 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $3.50.

This is a monograph in the American Lectures in Physiology series. Printed is easily-read type on good paper, this book sets forth in concise form the pertinent facts concerning the morphology of the pancreas, experimental methods of studying it, the pancreatic juice, functions of its external secretion, stimuli for the pancreas, secretin and pancreozymin, the functional innervation of the pancreas, and the mechanism of pancreatic secretion. There is an extensive bibliography at the end of each chapter as well as an author and subject index for the book. This book should be of interest to those desiring a concise summary of the physiology of the external secretion of the pancreas. It is not a textbook of diseases of the pancreas.

—*Commander, H. J. Alvis, MC, U. S. N.*

Orthopaedic Surgery, by *Walter Mercer,* M. B., Ch. B., F. R. C. S. (Edin.). F. R. S. (Edin). Professor of Orthopaedic Surgery, University of Edinburgh; Director of Orthopaedic Services to the South-Eastern Regional Hospital Board, Scotland. Formerly, Surgeon, Royal Infirmary, Edinburgh; Lecturer in Clinical Surgery, University of Edinburgh; Surgeon in Surgical Tuberculosis to the South-Eastern Counties of Scotland Joint Sanatorium, East Fortune; Surgeon, Ministry of Pensions Hospital, Edenhall; Consultant Surgeon, Clinic for Limbless Pensioners, Edinburgh; Consultant Surgeon in Orthopaedics, Emergency Medical Services, Department of Health for Scotland; Consultant Surgeon, Chalmers Hospital for the Sick and Hurt, Edinburgh; Surgeon to Selkirk and Galashield Cottage Hospitals; Surgeon-in-Charge, Tynecastle Orthopaedic Clinic; Specialist in Operative Surgery, Edinburgh War Hospital, Bangour; Examiner in Medical Electricity, Chartered Society of Physiotherapy; Consultant Surgeon, Tynecastle Orthopaedic Clinic, Ministry of Pensions; President, Scottish Local Board Chartered Society of Physiotherapy; with a foreword by *Sir John Fraser,* Bart., K. C. V. O., M. C., F. R. S. Ed., F. R. C. S. Ed., M. D., Ch. M., F. R. A. C. S., F. A. C. S., Regius Professor of Clinical Surgery in the University of Edinburgh. 4th edition. 1,016 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1950. Price $10.

Keeping pace with the broadening and changing effect of war lessons on orthopedic surgery, the author has thoroughly revised and enlarged his valuable and readable textbook. Many illustrations have been added and many others have been replaced. The author illustrates the comparatively new (1948) Denis Browne splint for congenital hip dislocation, but his section on congenital pseudarthrosis is not yet up to date. He quotes Putti's series of 13 with 11 failures, but omits Moore's series of 8 successful osteosyntheses with os novum. The nondefinitive massage, heliotherapy, contrast baths, and diets of the third edition have been omitted.

The chapter on general affections of the skeleton now includes a section on the role of blood in bone formation and one on fibrous dysplasia. His descriptions of physiologic chemistry are examples of clarity and brevity, e. g., "an increased blood flow * * * will rapidly remove the carbon dioxide

produced by the metabolism of the cell * * * which increases the solubility of calcium, and decalcification * * * occurs." The chapter on nontuberculous affections of joints, particularly with reference to venereal diseases, has been changed to conform with the changed clinical findings in these entities which have resulted from the increased availability of the antibiotics. Sections on Still's disease, Reiter's disease, Felty's syndrome, and gout have been added to the chapter on chronic arthritis. No reference to the Judet or other hip prosthesis was noted in the discussion of operative treatment of arthritis of the hip, and cheilotomy is still included as a therapeutic method, although many surgeons no longer consider cheilotomy or acetabuloplasty even temporarily palliative. Figure 201 captioned "Osteoarthritis" shows a roentgenogram of a hand with ulnar deviation of the fingers, subluxation of the metacarpophalangeal joints, marked bone atrophy, and almost no lipping, which seems more typical of rheumatoid arthritis.

The chapter on affections of the spine omits the illustration of the transabdominal fusion for spondylolisthesis, and also the descriptions of Ober's fasciotomy, Kleinberg's operation, the removal of hemivertebras, and the roentgenogram of Kummel's disease. The latter has been replaced with an extremely good roentgenogram of Calve's disease. Additions include a chart comparing pyogenic and tuberculous spondylitis, and a greatly enlarged section on herniation of the nucleus pulposus. The pain chart (figure 299) is not referred to in the 10 pages of text preceding or following it.

In the chapter on complications of trauma, the section on delayed union of fractures has been improved by the addition of a paragraph discussing inadequate immobilization as a cause of delayed union and by the omission of references to parathyroid extract to promote bone healing, the Matti bone chip inlay graft, and Whitman's method of treatment of fresh femoral neck fractures. Reconstruction of un-united hip fractures is advocated more strongly than before but the geometric osteotomy of Dickson, which is proving so satisfactory, is not mentioned. The author does, however, discuss the graft and nail combination of Dickson, and Patrick's success with this type of fixation.

There is no reference to types of femoral neck fractures, nor to Ashurst's classification of ankle fractures. The section on malunion of Pott's fractures has been revised. The section on os calcis fractures does not mention the open reduction of Palmer, nor the total excision of the os calcis by Pridie. A few words have been added on flexion contractures of the knee. Nowhere is there mention of the intramedullary fixation of fractures of the shaft of the femur, even in relation to pathologic fractures or leg-shortening operations. This book was written in response to requests from postgraduate and undergraduate students and is primarily for the young surgeon, but there are many items which would interest even the experienced orthopedist. The omissions are few, of minor importance, and generally of topics that might be considered controversial. The book is clearly written, gratifyingly brief, well indexed, and packed with useful and practical information.

—*Col. M. S. Thompson, MC, U. S. A.*

Toxaemias of Pregnancy, Human and Veterinary, A Ciba Foundation Symposium, edited by *John Hammond,* M. A., D. Sc., F. R. S., *F. J. Browne,* M. D., D. Sc., F. R. C. S., F. R. C. O. G., and *G. E. W. Wolstenholme,* O. B. E., M. B. 277 pages; 93 illustrations. The Blakiston Co., Philadelphia, Pa., publishers, 1950. Price $4.50.

This publication contains in addition to the final 3 summaries from the standpoint of the veterinarian, internist, and obstetrician, 26 papers which deal with several obscure complications occurring in some pregnancies of human beings and cattle. Although the majority of the contributors are from England and Scotland, a few European countries and the United States of

America are represented. The various symptoms and findings presented in the 6 papers on toxemias in veterinary medicine are suggestive of nutritional disturbances caused by acute deficiency diseases. Comparable conditions in human beings are acute yellow atrophy and hyperemesis gravidarum which differ from the preeclampsia-eclampsia syndrome. Several papers on the circulation in pregnancy reveal the need for further study and experiment in view of our present fragmentary knowledge. Ischemia of the uterus is suggested as a probable factor in the causation of toxemia.

The physiology of pregnancy and pathologic lesions in the hypertensive toxemias of pregnancy are well outlined. Studies regarding mono-amine oxidase activity of the placenta, thromboplastin complications, and histaminase in pregnancy are excellent contributions to our knowledge of the biochemistry of placental tissue. The papers regarding the endocrine status of pregnancy deal primarily with the hormones of placental origin and little discussion or reference is made to the possible role of the adrenal cortex hormones in causing toxemia. In spite of the studies recorded here and elsewhere by many contributors of accepted international repute in the subject, the cause and pathogenesis of pre-eclampsia remains obscure. This book serves the useful purpose of presenting considerable knowledge without attempting to gain the acceptance of one particular theory. For this reason it will prove interesting to the medical student, clinician, and workers primarily concerned with the basic sciences. It can be used as a basis for future research which will probably require the combined efforts of the clinician and his laboratory colleagues to clarify the situation.—*Commander E. B. Hopper, MC, U. S. N.*

Injuries to the Ankle, by *J. Grant Bonnin*, M. B., B. S. (Melbourne); F. R. C. S. (England); Orthopaedic Surgeon, Central Middlesex Hospital; Late Orthopaedic Registrar, West London Hospital; Acting Registrar, Royal National Orthopaedic Hospital; Orthopaedic Surgeon, E. M. S., White Lodge Hospital; Lieutenent-Colonel, R. A. M. C.; Orthopaedic Adviser, South East Asia Command; Hunterian Professor, Royal College of Surgeons. 412 pages; illustrated. Grune & Stratton, New York, N. Y., publisher, 1950. Price $8.50.

This interesting book covers its subject thoroughly. It is filled with timely information concerning all types of injuries to the ankle, but for most readers this information is buried in a minute description of how these injuries occur. Thus, the work is at once restricted to the research-minded reader and thereby loses much of its potential value. It is to be hoped that the average practicing physician, the radiologist, and the resident will read this book as well as the orthopedist but it is feared that the author has made his treatise too technical to attract this group of readers. Chapter 3 is especially useful, in showing a positive method for differentiating sprains from ruptures of the ligaments. The author uses the term "sprain" in the sense of an unruptured ligament, or, as we say, "strain." This reviewer has used the "strain radiograph" for several years, and to this single method of examination is credited the almost total lack of so-called chronic sprains developing from acute injuries. This book is of great value in providing a ready source for explanation of this method of examination. In so well illustrated a book there should have been some diagrams illustrating methods of this type. The description of the actual performance of these tests on the patient could also have been clearer for in actual practice this is not as easily performed as the terms "inversion" and "eversion" lead one to assume.

There is an excellent historical chapter followed by a detailed and well-illustrated description of the anatomy of the ankle. There follows a minutia of details concerning the mechanisms of fractures and sprains which makes up three-quarters of the book. This will undoubtedly come to be the authority in English on this particular subject. As the author points out in his preface,

the glossary should be read first, as many of the terms used in the book differ from our usual conceptions. This volume will undoubtedly be well received among orthopedists and should be on every hospital and reference library's shelf.—*Commander H. T. Stradford, MC, U. S. N.*

A Textbook of the Practice of Medicine, by various authors. Edited by *Frederick W. Price*, F. R. S. Ed., M. D., C. M. Ed., F. R. C. P. Lond., Hon. M. D. Belf., Consulting Physician to the Royal Northern Hospital and to The National Hospital for Diseases of the Heart, London; formerly Physician and Honorary Pathologist to The Mount Vernon Hospital for Consumption and Diseases of The Chest, and Examiner in Medicine at The University of St. Andrews. 8th edition. 2,076 pages. Geoffrey Cumberlege, Oxford University Press, New York, N. Y., publishers, 1950. Price $9.

This new edition has been thoroughly revised, many articles have been entirely rewritten and several new articles have been added. The subject matter is divided into 20 sections, covering all the subdivisions of medicine, each written by a recognized authority. The material is presented in a clear, concise manner, the emphasis being placed on diagnosis, prognosis, and treatment. Because of recent advances in therapy, particularly by newer antibiotics, some of the material on treatment is already outdated, but this defect is inherent in a work of this type and does not detract from its value. The book is an authoritative and readable text on the practice of medicine and a worth-while addition to any medical library.—*Col. C. A. Best, MC, U. S. A.*

Periodontia, Clinical Pathology and Treatment of the Periodontal Tissues, by *Edgar D. Coolidge*, B. S., M. S., D. D. S., LL. D. (Hon. Loyola), Professor Emeritus of Therapeutics, Preventive Dentistry and Oral Hygiene, Chicago College of Dental Surgery, School of Dentistry, Loyola University, Chicago, Ill.; formerly Professor of Materia Medica, Pharmacology and Therapeutics of the School of Dentistry, University of Illinois; and *Maynard K. Hine*, M. S., D. D. S., Professor of Periodontia and Histopathology and Dean, Indiana University School of Dentistry; formerly Rockefeller Fellow in Dentistry and Carnegie Fellow in Dentistry, Rochester School of Medicine and Dentistry and Assistant Professor of Dental Pathology and Therapeutics School of Dentistry, University of Illinois, Chicago, Ill. 318 pages; 378 illustrations on 219 figures and 2 colored plates. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $6.

This book will give the reader a sound, fundamental knowledge of periodontal disease and acceptable methods of treatment. The subject is presented in logical sequence beginning with the normal, healthy periodontal tissue and proceding to the gradual tissue changes that develop with inflammation, the degenerative periodontal changes associated with certain systemic disorders, the influence of trauma, and the importance of home care.

The discussion of the pathologic changes in the periodontal structure is concise and readily understandable, presenting a graphic description of cellular reaction to inflammation, the degenerative changes seen in periodontosis, periodontal atrophy and trauma, and the progressive tissue changes of inflammatory and fibrous hyperplasia. The authors classify gingival enlargement as either inflammatory or fibrous hyperplasia eliminating the term gingival hypertrophy. They state: "Hyperplasia of the gingival tissue, commonly called hypertrophic gingivitis, is a collective term for conditions in which there is an increase in size of the gingival tissue."

The treatment of gingivitis caused by local irritation is thoroughly discussed, as well as the physiologic processes involved in the deposition of calculus. A section on gingivitis caused by infection is mostly concerned with

Vincent's infection, or, as the authors prefer to call it "necrotizing gingivitis." The cause, symptoms, microscopic findings, and pathogenicity are completely and logically discussed. The section which deals with the treatment of acute necrotizing gingivitis is disappointing because of the great emphasis placed on drug therapy. The most effective method of treatment is debatable. No method is effective, however, that does not have as its prime object the elimination of all local irritating factors, or the improvement of systemic conditions which may be interfering with the health of the oral tissues and may have caused them to become susceptible to infection. The authors are in agreement on this point, but because this chapter describes the treatment of this infection with oxidizing agents, mercurial derivatives, aniline dyes, caustics, arsenicals, sulfonamides, and antibiotics in great detail it would appear that the use of these preparations is of primary importance in eliminating this infection.

Adequate consideration is given to oral manifestations of systemic disturbances such as gingivitis caused by dietary deficiencies, faulty metabolism, and blood dyscrasias. A description of many miscellaneous oral conditions is included. The views of the authors on the cause, pathologic changes, management, and prognosis of periodontitis and peridontosis follow the accepted teachings and are well illustrated. The chapter dealing with the functional response to occlusal stress and the treatment of trauma is excellent, as well as the discussion on the importance of home care in the treatment of periodontal disease. This book is well illustrated, contains an ample bibliography, and, for the most part, deals thoroughly and rationally with periodontal problems.—*Lt. Col. D. B. Lenkerd, U. S. A. F. (MC)*

Diathermy, The Use of High Frequency Currents, by *Stafford L. Osborne,* B. P. E., M. S., Ph. D., Professor and Chairman, Department of Physical Medicine, Northwestern University Medical School. Publication Number 91, American Lecture Series. 113 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $3.

This book presents in a concise manner the use of all types of high-frequency currents in the treatment of pathologic processes. Conventional, short wave, and microwave diathermy are all well described and a short chapter is included on the principles of surgical diathermy. The indications and contraindications for each type of diathermy are well defined and the technics of their application for each part of the body are clearly described and admirably illustrated. This book will prove extremely useful as a reference for all physical therapy technicians and physiatrists and will serve as a handy guide to all physicians who have occasion to prescribe the application of high-frequency currents.—*Commander H. S. Etter, MC, U. S. N.*

Fundamentals of Clinical Fluoroscopy, With Essentials of Roentgen Interpretation, by *Charles B. Storch,* M. D., Adjunct, Radiodiagnostic Department and Radiotherapy Department, Beth-El Hospital, Brooklyn, N. Y. 196 pages; illustrated. Grune & Stratton, New York, N. Y., publishers, 1951. Price $6.75.

By publishing this small volume, the author filled a vacant place in radiologic literature. The literature on roentgenography is voluminous, but it is difficult and time consuming to locate information concerning fluoroscopy. The author has clearly, briefly, and effectively described and illustrated fluoroscopic examination of the thorax and abdomen. Problems related to study of the lungs, cardiovascular system, and the gastrointestinal tract are thoroughly discussed. An informative chapter covers the physics, technic, and dangers of fluoroscopy, as well as the physiology of dark adaptation. By means of this book the student of fluoroscopy can quickly gain knowledge which his predecessor could acquire only after vast experience. If residents in radiology have access to this text, they will avoid many pitfalls, some of which are potentially dangerous. Most students have difficulty learning to recognize the

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fluoroscopic appearance of the various cardiac chambers in normal and abnormal conditions. The author has handled this subject extremely well. The essentials of roentgen interpretation mentioned in the subtitle are given a subordinate role in the text, but roentgenography and fluoroscopy are so closely related that a sharp division is not possible.—*Col. H. I. Amory, MC, U. S. A.*

The American Red Cross, A History, by *Foster Rhea Dulles*. 554 pages. Harper & Brothers, New York, N. Y., publishers, 1950. Price $5.

This book describes the founding of the American Red Cross 70 years ago, its pioneer days under Clara Barton, the reorganization and the new developments at the beginning of the twentieth century, the great expansion under the War Council during World War I, the readjustments of the years of peace, the effect of the New Deal on the program, and the record of the Red Cross in World War II. The author defines the American Red Cross as an agency of the American people, supported by them, and reflecting their prevailing temper. He notes that in times of war the citizens contributed in every possible way; volunteers from all economic levels worked side by side in canteens, in hospitals, and wherever needed. Membership expanded and fund drives exceeded quotas. In contrast to this, fault finding, and criticism, both of the organization and of its individual members is rife in peace time. The peacetime programs; such as, promotion of public health and national blood programs lacked the dramatic appeal of the war time programs. During the years of the depression the government assumed the responsibility of many of the programs, for which the Red Cross previously had been responsible. This was acceptable to the Red Cross, as its primary function was to meet the needs of the American people, which could not be met in any other way.

This book is an excellent history of the American Red Cross as an organization. It ably depicts the impact of modern science, technology, and social change on an organization in a democratic society. It is recommended as an excellent reference work for the student of social sciences.

—*Lt. (jg) O. C. Upchurch, NC, U. S. N.*

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